TM 11-6625-364-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

DISTORTION TEST SETS TS-383\GG, TS-383A\GG, AND TS-383B\GG

HEADQUARTERS, DEPARTMENT OF THE ARMY

NOVEMBER 1965

WARNING

This equipment has 115 volts ac applied through its input power cable. One hundred fifteen volts dc also exists in the equipment under certain test conditions. Be extremely careful when adjusting or checking equipment under test. Serious injury or death may result from contact with these voltages.

DON'T TAKE CHANCES!

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***TM 11–6625–364–12**

TECHNICAL MANUAL
No. 11–6625–364–12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *17 November 1965*

Organizational Maintenance Manual
DISTORTION TEST SETS TS–383/GG, TS–383A/GG, AND TS–383B/GG

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***This manual supersedes so much of TM 11–2217, 16 October 1946, including C 1, 18 November 1948, C 2, 14 April 1950 C 3, 1 May 1958, and C 6, 6 September 1963 as pertains to operation and to operator's and organizational maintenance of Distortion Test Sets TS–383/GG, TS–383A/GG, and TS–383B/GG.**

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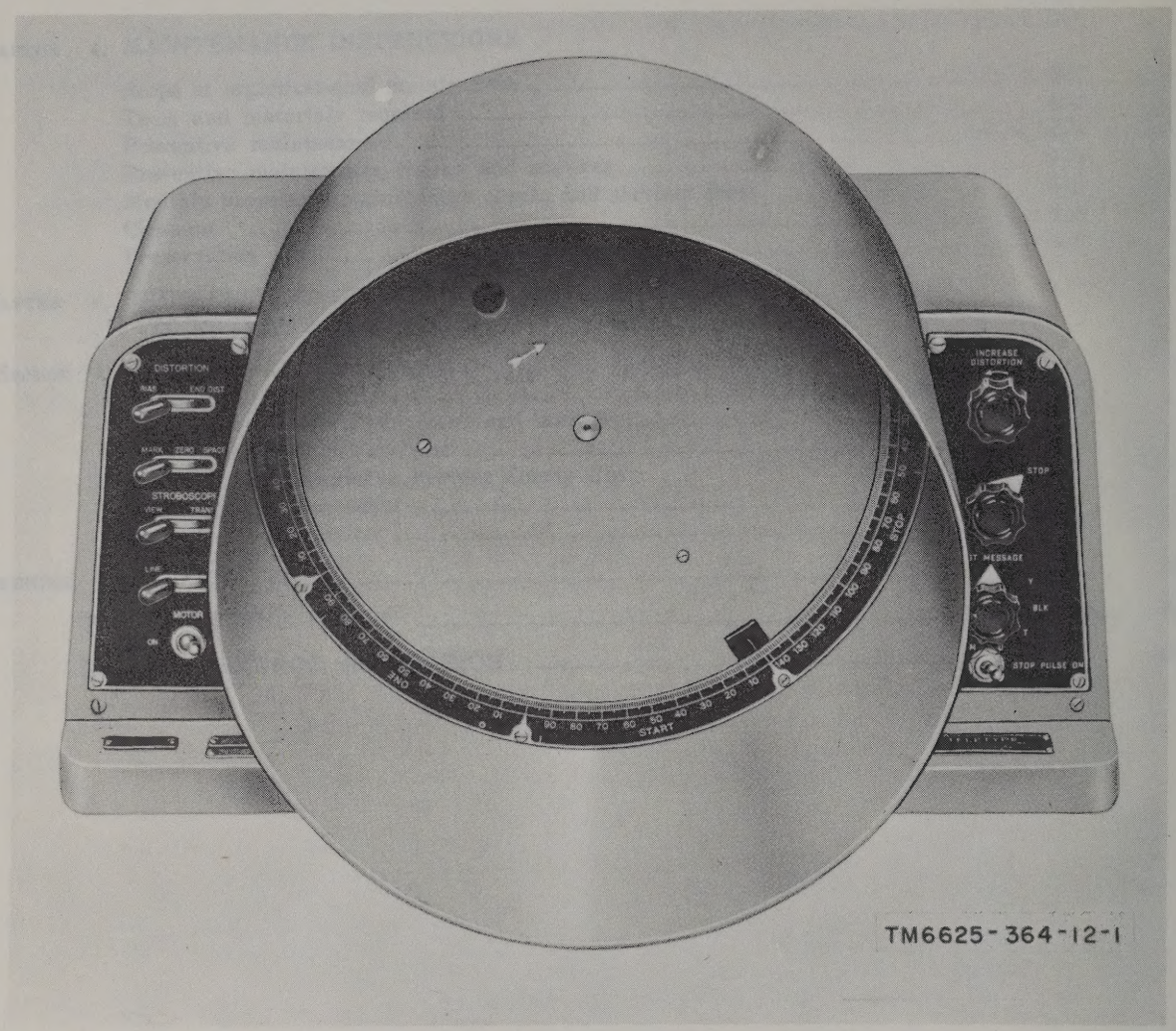


Figure 1-1. Distortion Test Set TS-383(*)/GG.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Distortion Test Sets TS-383/GG, TS-383A/GG, and TS-383B/GG (fig. 1-1) and covers their installation, operation, and organizational maintenance. The manual includes instructions for operating the equipment and also prescribes the preventive maintenance checks and services required to keep the equipment in combat-serviceable condition. Unless otherwise specified, the information in this manual applies to all models of the equipment.

b. Official nomenclature followed by an asterisk is used to indicate all models of the TS-383/GG covered in this manual. Thus, Distortion Test Set TS-383/GG represents Distortion Test Sets TS-383/GG, TS-383A/GG, and TS-383B/GG. Throughout this manual, the TS-383/GG will be referred to as the test set.

1-2. Index of Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to this equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 7, 8, and 9), supply bulletins, lubrication orders, and modification work orders which are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and reords in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Reporting of Equipment Manual Improvements. The direct reporting by the individual user, of errors, ommissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvements. This form will be completed using pencil, pen, or typewriter and forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, N. J. 07703.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Purpose. Distortion Test Set TS-383(*)/GG is a motor-driven teletypewriter test set which provides a variety of 7.42-unit teletypewriter signals for adjusting and testing teletypewriter equipment, and also analyzes 7.42-unit signals received from teletypewriter equipment.

b. Use. The test set may be used to check the sending and receiving mechanisms of 7.42-unit teletypewriter equipment. It may also be used to test bias meters, polar relays, direct current (dc) teletypewriter terminal and repeater equipment, telegraph carrier terminal and repeater equipment, and teletypewriter test equipment. The test set is usually used at general support and depot maintenance facilities and at large Signal communications centers.

1–5. Technical Characteristics

Code used	Baudot, start-stop, five-unit.
Code length	7.42 units. Stop impulse is 0.42 units longer than the start and the other five impulses.
Signal modulation rates	45.5, 50, 75 bauds.
Signal currents	Dc cord circuit, approximately 10 ma dc. Stroboscope cord circuit, approximately 10 ma dc. Signal line cord circuit, up to 60 ma dc.
Motors	Synchronous and series-governed.
Speed of operation	368 opm (60 wpm), 404 opm (67 wmp), and 600 opm (100 wpm).
Power consumption:	
Series-governed motor	Approximately 150 watts.
Synchronous motor	Approximately 120 watts.
Input voltage requirements	*Synchronous motor:* 110–115 volts, 60 cps ac. *Series-governed motor:* 110–115 volts, 50–60 cps ac.
Test signals	Continuous repetition of a standard teletypewriter test message THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING, or one of the following teletypewriter characters: R, Y, T, O, M, V, LTRS (letters shift), BLK (blank), and code length mark impulses. *Note.* The letters DTS in the test message above can be changed to any 3-letter combination of letters in some B models of the test set.
Test signal quality	Quality of test signal produced by the test set is controllable. Signals containing zero distortion or signals containing up to 100 percent distortion can be generated and transmitted.

1–6. Components of Test Set

The current official listing of the components that comprise the individual models of the test set is contained in the basic issue items list (app II).

1–7. Description of Test Set
(figs. 1–1 and 1–3)

a. Physical. The test set is a self-contained unit 19 inches long, 13 1/2 inches high, and 14 inches deep. A rectangular metal cover (fig. 1–2) protects the motor, gears, code disks, electrical contacts, and other parts of the test set. A circular metal hood (viewing hood) mounted on the front of the test set reduces glare when viewing signals. A heavy cast iron base provides ruggedness and stability to the test set. The complete assembly weighs approximately 75 pounds.

b. Mechanical.

(1) A synchronous or series-governed motor provides the mechanical power required to operate the test set. The motor drives a main shaft to which is coupled a rotating distributor brush-arm assembly and a set of five circular, cammed code disks. Interchangeable gears, mounted on the motor shaft and the main shaft, provide a means for changing the operating speed of the test set.

(2) A movable, calibrated metal distortion scale is mounted to the front of the test set and is used for checking the length and positioning of teletypewriter impulses produced and received by the test set.

c. Electrical.

(1) The rotating distributor brush-arm assembly (fig. 1–3 and *b*(1) above) passes over fixed, circular commutator rings, and opens and closes electrical circuits connected to the commutator rings in the proper sequence to produce 7.42-unit teletypewriter signals. A neon lamp mounted on the rotating distributor brush-arm assembly lights each time a *mark* (current) impulse is produced. The rotation of the distributor brush-arm assembly and the lighting of the neon lamp contitute a stroboscope within the test set.

(2) The five cammed code disks (*b*(1) above) rotate when the motor is running. When the test signal control (para 3–1) is set at TEST MESSAGE, the cammed surfaces of the disks open and close electrical switches in the proper sequence to produce the test message, THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING. The code disks are not coupled to the electrical switches when the test signal control is set in the position other than TEST MESSAGE.

(3) Cords are provided on the test set for connection to power sources and equipment under test.

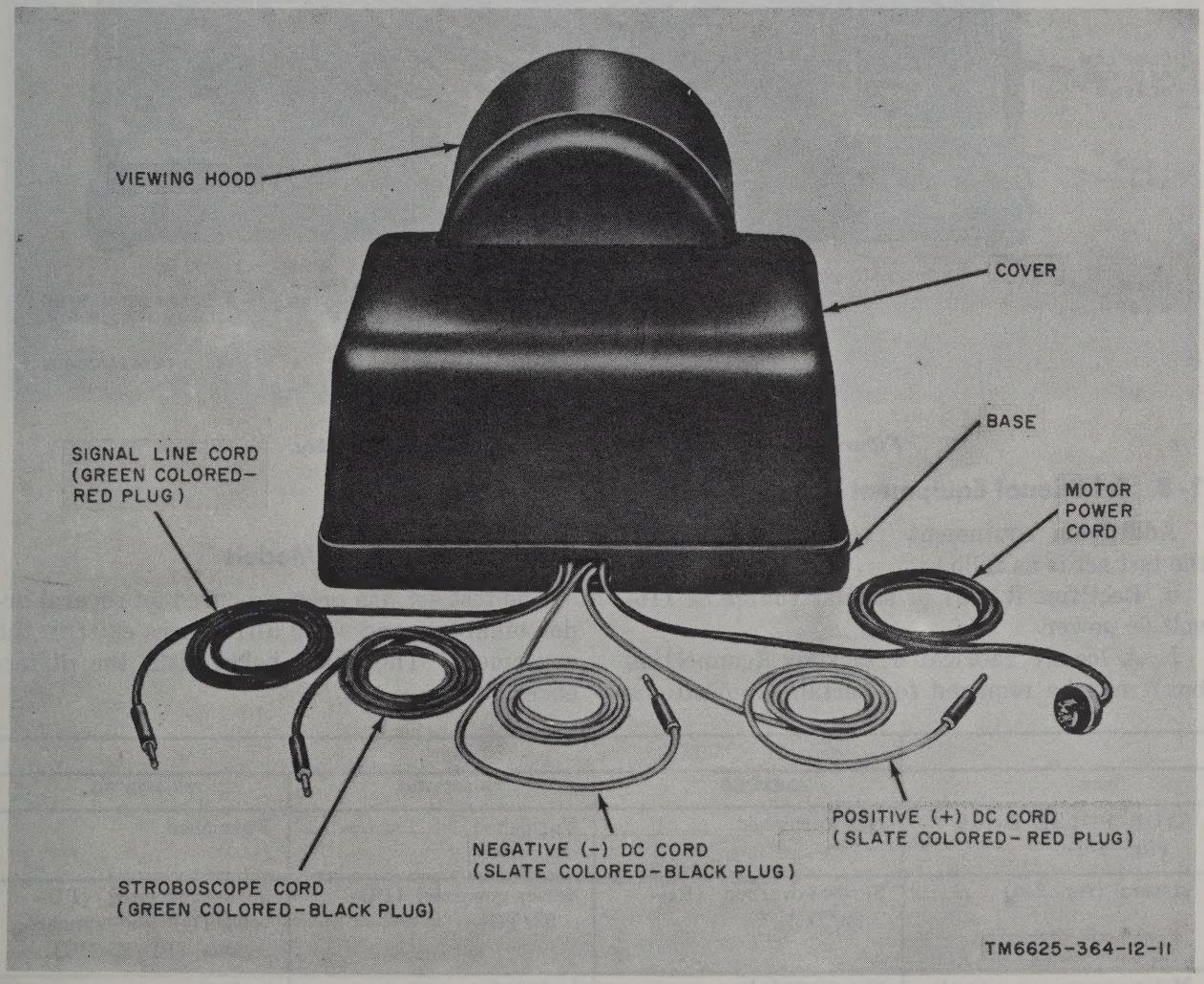


Figure 1–2. Test set, rear view.

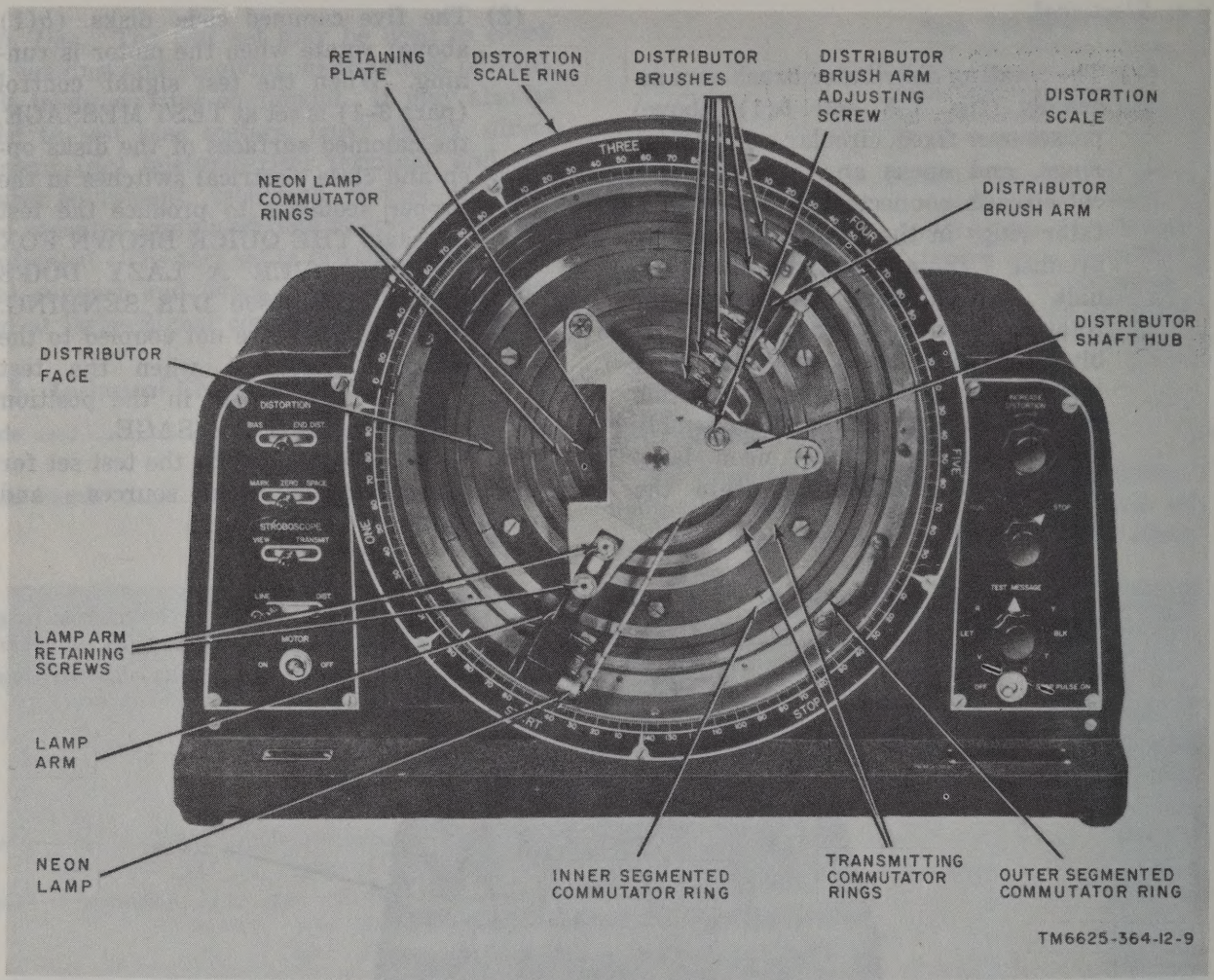


Figure 1–3. Test set, distributor and stroboscope assembly.

1–8. Additional Equipment Required

Additional equipment required to operate the test set is as follows:

a. Rectifier RA–87 or similar source of 115-volt dc power.

b. A locally fabricated jackbox (connection box) may be required for certain applications of the test set.

1–9. Differences in Models

The test set has been procured on several order numbers, and some differences exist in the equipment. The chart below lists the differences.

	Model		
Item	TS–383/GG	TS–383A/GG	TS–383B/GG
STOP PULSE switch (fig. 3–1).	Not furnished	Furnished	Furnished.
Motors (fig. 2–3)	Series-governed (PU–93/TG).	Series-governed (PU–93/TG).	Series-governed (PU–93/TG) and synchronous (PD–22/UG).
Motor power, dc, stroboscope, and signal line cords (fig. 1–2).	Not included	Included	Included.

Item	Model		
	TS–383/GG	TS–383A/GG	TS–383B/GG
Outer ring brake ------	Included ----------	Not included ----------	Not included.
Code disks (fig. 2–6) ----	Furnished with non alterable code disks.	Furnished with non-alterable code disks.	Some B models of the test set are furnished with code disks that accommodate interchangeable segments (fig. 2–6) for changing the call signs in the test message produced by the test set.

CHAPTER 2

INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unpacking

a. Packing Data.

(1) *Domestic shipment* (fig. 2-1). When packed for domestic shipment, the test set is first wrapped in paperboard cushioning material and then overwrapped with waterproof wrapping paper. Open seams in the package are then sealed with paper gummed tape. Unmounted parts of the test set, such as the auxiliary motor, operating speed gears, interchangeable code disk segments, and other loose items (not shown), are wrapped separately and packed under the cover of the test set. The test set is then placed in a wooden box and the box nailed closed.

(2) *Oversea shipment* (fig. 2-2). When packed for oversea shipment, the test set is placed in a cushioned fiberboard box and sealed with water-resistant, pressure-sensitive tape. Unmounted parts (not shown) of the test set are packed as described in (1) above. The fiberboard box is then placed in a wooden box and the box nailed closed. Metal strapping is placed around the box for added protection.

b. Removing Contents.

(1) *Packages wrapped for domestic shipment.*

(*a*) Remove the top cover of the wooden box with a hammer or nailpuller.

(*b*) Carefully lift the test set out of the wooden box and tear off the waterproof wrapping paper and paperboard cushioning material.

(*c*) Remove the metal cover of the test set and carefully lift out the unmounted parts mentioned in *a*(1) above.

(2) *Packages wrapped for oversea shipment.*

(*a*) Cut the metal strapping and remove the top cover of the wooden box with a hammer or nailpuller.

(*b*) Tear or cut open the sealed top seam of the fiberboard box and carefully lift out the test set.

(*c*) Remove the metal cover of the test set and carefully lift out the unmounted parts mentioned in *a*(1) above.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 1-3).

b. See that the equipment is complete, as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (app II). Items not mounted on the test set can be found under the metal cover of the test set. Report all discrepancies in accordance with TM 38-750. Short age of a minor assembly or part that does not affect proper functioning of the test set should not prevent use of the test set.

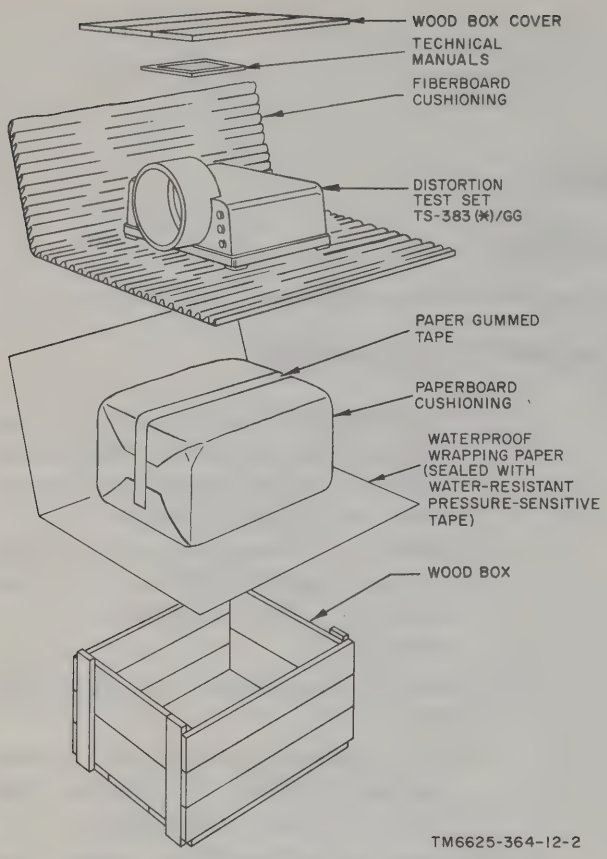


Figure 2-1. Typical packing for domestic shipment.

c. If the test set has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check to see if the MWO number (if any) and appropriate notations concerning the modification have been entered in the equipment manual.

Note. Current MWO's applicable to the test are listed in DA Pam 310-4.

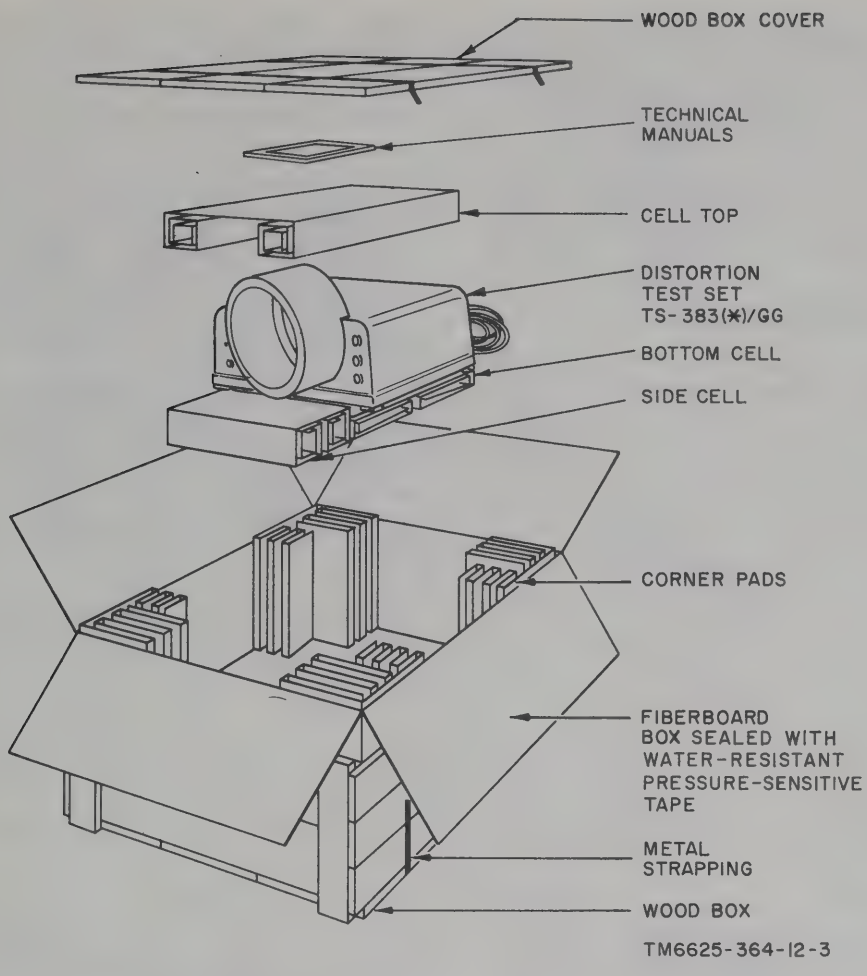


Figure 2–2.. Typical packing for oversea shipment.

Section II. PRELIMINARY INSTALLATION AND LUBRICATION PROCEDURES

2–3. Tools, Lubricants, and Other Items Required for Installation

a. Tools. The tools required to install and prepare the test set for use may be found in Tool Equipment TE–50–B.

b. Lubricants. Refer to paragraph 2–8 for a list of approved lubricants and lubrication instructions for the test set.

c. Other Items. Some installations of the test set may require the use of alligator clips, jacks, plugs, cords, test leads, and similar connecting devices to connect the test set to the equipment under test.

2–4. Siting

The test set should be installed or set up on a sturdy flat bench or table, close to suitable sources of alternating current (ac) and dc power. In fixed installations, the test set should be mounted into the operator's bench or table, and the cords on the test set terminated in appropriate jacks, switches, binding posts, and screw-type terminals. Such an installation provides a rapid and effective means for interconnecting the test set and equipment under test. In a less permanent type of installation, a small metal or wooden box can

be used as the interconnecting facility. The box should contain all the interconnecting devices (jacks, switches, binding posts, and screw-type terminals) required to interconnect the test set and equipment under test. When neither of the above facilities is available, the test set can be connected to equipment under test by use of specially fabricated cables as shown in figures 3–3, 3–4, and 3–5.

2–5. Adjusting Operating Speed

a. General (fig. 2–3). The test set is furnished with interchangeable gears which provide for operating the equipment at 60 and 100 words per minute (wpm). Two sets of gears (one worm and one helical gear per set) provide for operation of the test set at 60 or 100 wpm when the synchronous motor is used (one set of gears for each speed). Another two sets of gears (one worm and one helical gear per set) provide for operation of the test set at 60 or 100 wpm when the series-governed motor is used (also one set of gears for each speed). The test set may be operated at 67 wpm by use of the series-governed motor and the 60-wpm gears. The gears furnished for the synchronous motor cannot be used with the series-governed motor, nor can the gears furnished for the series-governed motor be used with the synchronous motor.

b. Motor and Gear Information. (fig. 2–3). The chart below lists the motors and gears used for operation of the test set at 60 and 100 wpm. The part numbers shown in the chart for the worm and the helical gears are stamped on the gears.

Motor	Operating speed (wpm)	Worm gear a		Helical gear a	
		Part No.	Teeth	Part No.	Teeth
PU–93/TG (Teletype part No. MU26, series-governed).	60	102667	7	102668	40
	100	110898	10	110899	35
PD–22/UG (Teletype part No. MU4, synchronous).	60	102662	9	102663	44
	100	110889	12	110890	36

[a]Consists of two parts each, a hub portion and a gear portion (fig. 2–3).

c. Gear and Motor Installation (figs. 2–4 and 2–5). When shipped, the test set does not have a motor or gear set installed, although one of the motors furnished with the equipment is secured to the motor plate mounting pillars during shipment. Remove this motor if it is not the one desired for operation. To install, replace, or remove a motor or gear set, perform the following procedures:

(1) *Installation or replacement.*

(*a*) Select the worm and helical gears required (*b* above).

(*b*) Unscrew the hub from the worm gear.

(*c*) Place the hub on the motor shaft with the threads facing the end of the motor shaft (fig. 2–4).

(*d*) Place the worm gear on the motor shaft and screw the hub and gear portions together. The worm gear and the hub have left-hand threads. If the parts are difficult to tighten adequately, wind several layers of cloth around the gear teeth and hold this portion firmly while turning the hub with a wrench. *Do not* use pliers or wrenches to hold the gear; severe damage to the gear may result.

(*e*) Loosen the motor plate adjusting screw locknut (fig. 2–5) and turn the adjusting screw clockwise until the screw extends approximately 1/2 inch below the bottom of the motor plate.

(*f*) Position the motor plate on the three motor plate mounting pillars and partially tighten the motor plate mounting screws.

(*g*) Unscrew the hub from the helical gear.

(*h*) Plate the hub over the end of the main shaft with the threaded portion facing the end of the main shaft.

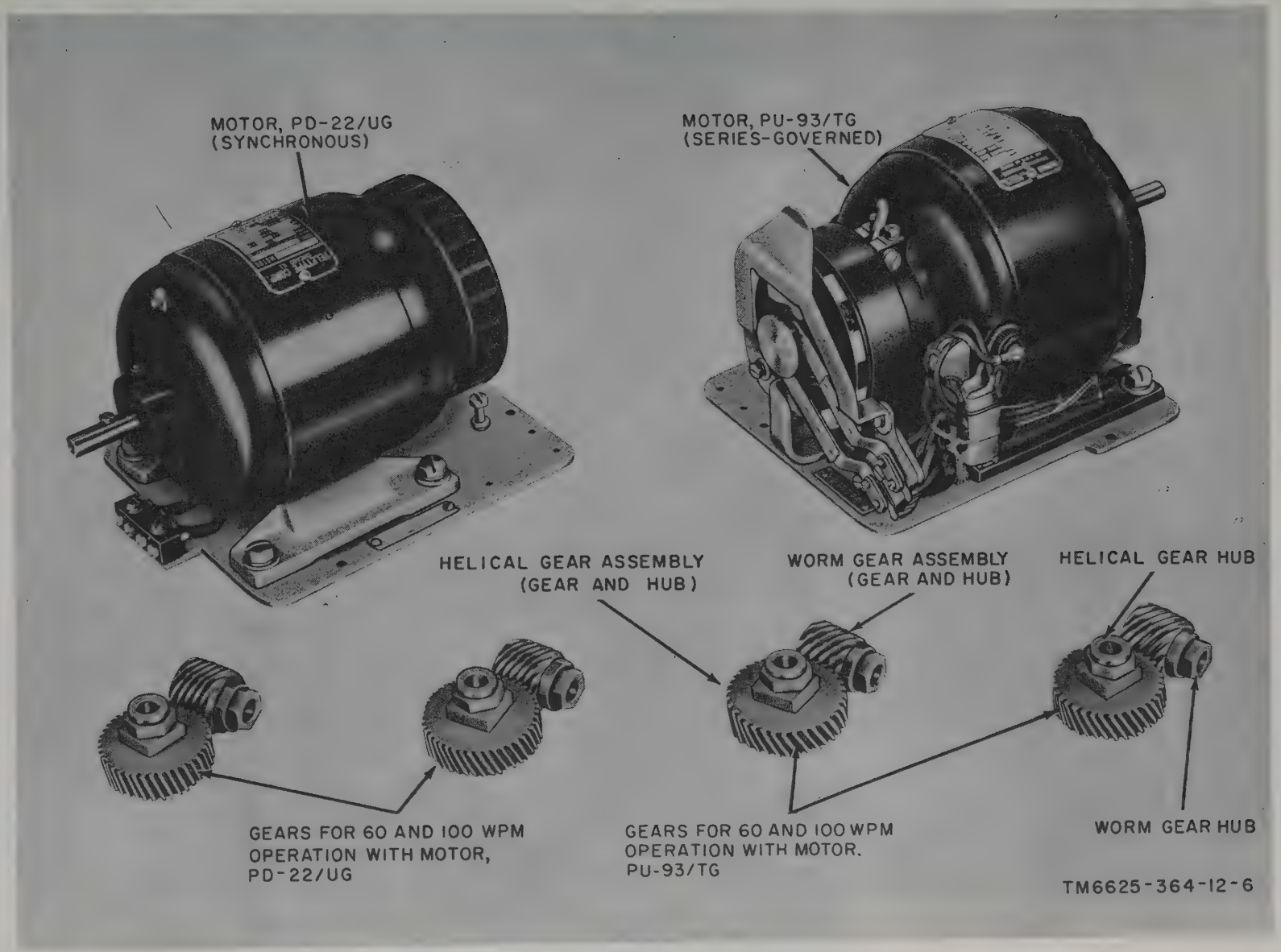


Figure 2–3. Motors and gears.

(*i*) Place the helical gear over the end of the main shaft and screw the hub and the gear portions together. The helical gear and the hub have left-hand threads. If the parts are difficult to tighten adequately, follow the procedure given in (*d*) above. While screwing the parts together, position the helical gear assembly directly over the worm gear assembly.

(*j*) Turn the motor plate adjusting screw counterclockwise until the worm gear on the motor and the helical gear on the main shaft mesh without binding and with a minimum of backlash.

(*k*) Tighten the motor plate adjusting screw locknut and the motor plate mounting screws.

(2) *Removal.*

(*a*) Remove the three motor plate mounting screws.

(*b*) Tilt the motor so that the worm gear on the motor shaft and the helical gear on the main shaft disengage from each other.

(*c*) Lift the motor off the motor plate mounting pillars.

(*d*) Remove the worm gear from the motor shaft.

(*e*) Remove the helical gear from the main shaft.

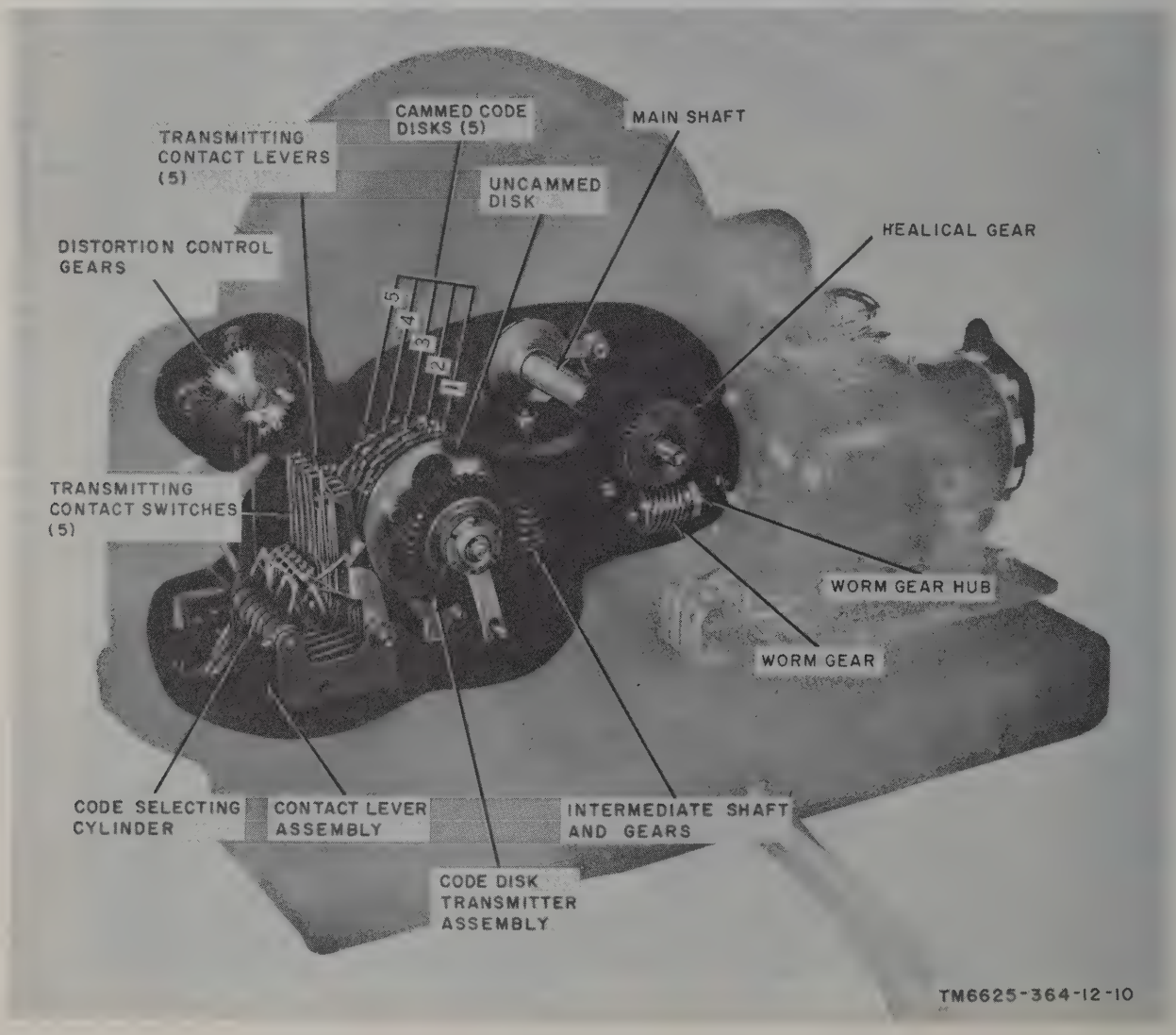


Figure 2–4. Test set, cover removed showing gears, code disks, and other parts.

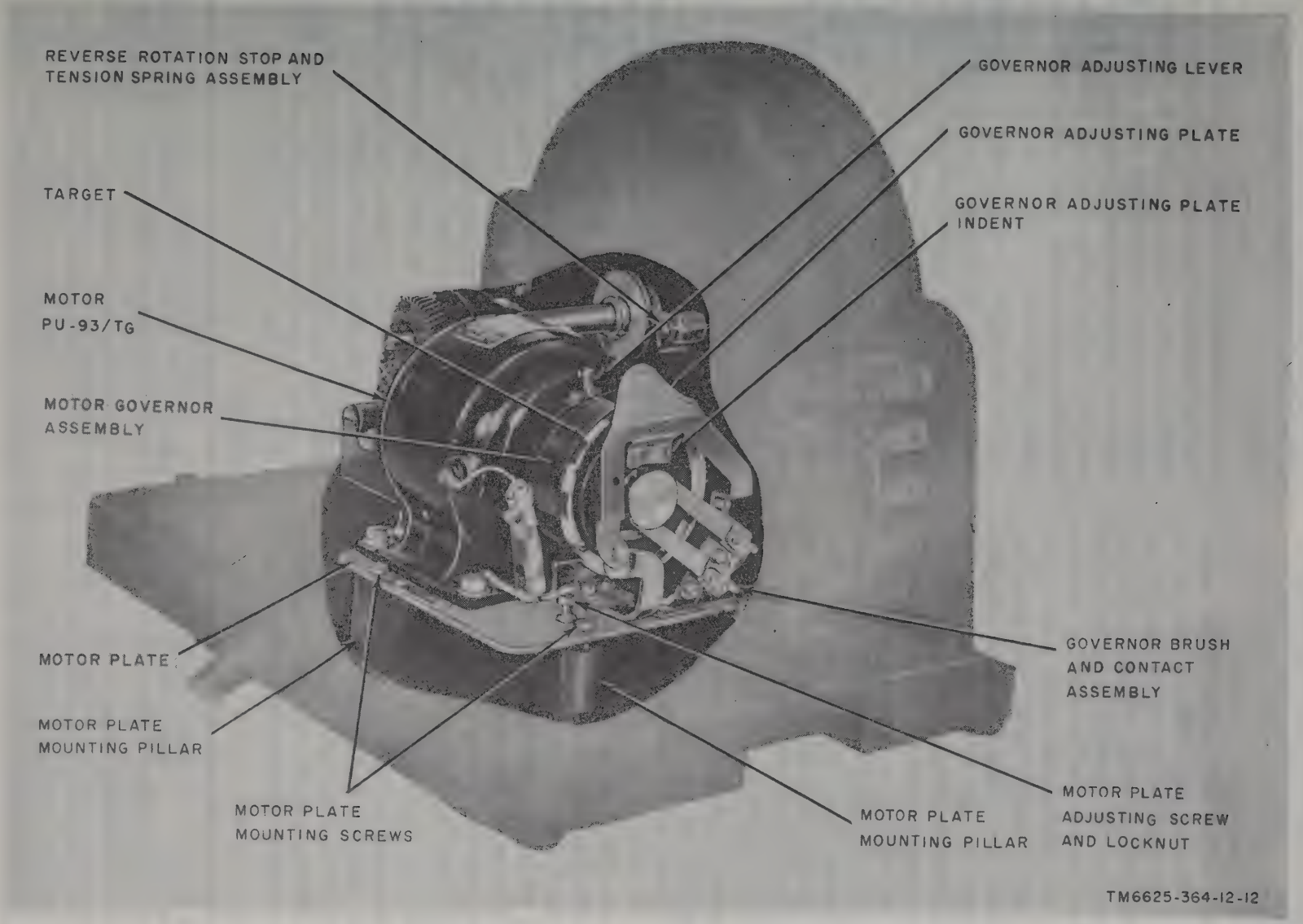


Figure 2–5. Test set motor installation.

2–6. Adjusting Speed of Series-Governed Motor

(fig. 2–5)

The electrical characteristics of the series-governed motor supplied with the test set are such that the speed of the motor must be adjusted whenever the input voltage to the motor varies above or below a certain critical value. For operation of the test set at 60 or 100 wpm, the speed of the motor must be adjusted to approximately 2,100 revolutions per minute (rpm). A tuning fork which vibrates at 87.6 vibrations per second (vps) is used to make the 2,100-rpm adjustment. For operation of the test set at 67 wpm, the speed of the motor must be adjusted to approximately 2,303 rpm and a 96.1-vps tuning fork is used to make the adjustment. The worm and helical gears used for 60-wpm operation (para 2–5) are also used for 67-wpm operation. Adjust the motor speed as follows:

a. Strike the appropriate vps tuning fork gently against the hand to make it vibrate. View the spots on the rotating target wheel through the vibrating shutters of the tuning fork. If the motor is turning at the correct speed, the target will appear to be stationary. If the motor is turning too fast, the target will appear to move in the direction in which the motor is turning. If the motor is turning too slow, the target will appear to move in a direction opposite to that in which the motor is turning.

b. If the motor is turning too fast, slow it down by pressing the *governor adjusting plate* toward the motor for a few seconds. Recheck the motor speed as indicated in *a* above. If necessary, make another adjustment by again pressing the governor adjusting plate. Continue this process until the motor speed is properly adjusted.

c. If the motor is turning too slow, speed it up by pressing the *governor adjusting lever* toward the motor for a few seconds. Recheck the motor speed as indicated in *a* above. If necessary, make another adjustment by again pressing the governor adjusting lever. Continue this process until the motor speed is properly adjusted.

d. If difficulty is experienced in adjusting the motor speed so that the spots on the target remain stationary, adjust the speed so that the spots appear to travel slowly in the direction in which the motor is turning. If the spots move back and forth or disappear suddenly, the *governor brush and contact assembly* is probably defective and the motor should be repaired or replaced.

2–7. Installation of Station Call-Letters Segments

Some B models of the test set are equipped with slotted code disks that accommodate interchangeable segments (fig. 2–6) which provide any three letters of the alphabet which may be used for the station identification (call sign) portion of the test message (fig. 2–8). Thirty code disk segments (five each of the six shown in figure –26) are furnished with the specially equipped test sets. The following procedure is used to install the segments.

a. Determine the letters or call sign desired and prepare a chart as shown below.

Note. The chart below has been filled in to illustrate the entries required for setting up the call sign UEP in the test message.

Test message code group	Station call-letters desired	Code impulses				
		Disk No. 1	Disk No. 2	Disk No. 3	Disk No. 4	Disk No. 5
67th	U	M	M	M	S	S
68th	E	M	S	S	S	S
69th	P	S	M	M	S	M
Segment required		126807	126810	126810	126809	126808

b. Refer to the teletypewriter code chart (A, fig. 2–7) to determine the mark (M) and space (S) impulses that make up the individual letters of the call sign selected. Note that for the letter U, the impulses are M, M, M, S, and S; for the letter E, the impulses are M, S, S, S, and S; and for the letter P, the impulses are S, M, M, S, and M. Enter this impulse information in the *Code impulses* columns of the chart in *a* above.

c. Refer to B, figure 2–7 to determine which segments will be required to produce the mark and space impulses shown in the *Code impulses* columns of the chart in *a* above. Note that to produce the letters UEP, the segment in disk No. 1 must be a segment which will produce two mark and one space impulse. Segment 126807 fulfills this requirement so that the number 126807 is entered at the bottom of the *Disk No. 1* column. The second disk (Disk No. 2) must contain a segment which will produce a mark, a space, and a mark impulse, in that sequence. Segment 126810 fulfills this requirement so that the number 126810 is entered at the bottom of the *Disk No. 2* column. Continue the above process until the chart is completed.

d. Snap the segments selected in *c* above into the code disks so that the 67th, 68th, and 69th impulses are produced in the order shown in B, figure 2–7. Note that the code disks rotate counterclockwise when viewed from the rear of the test set. Be particularly careful to put the correct segment into the correct code disk. The numbering of the code disks is shown in figure 2–4.

e. Use extracting tool 126812 (fig. 2–6) to remove the segments from the code disks.

2–8. Lubrication Instructions

a. General. The test set must be lubricated before initial use, after it has been overhauled or repaired, and at monthly intervals.

b. Preparation for Lubrication.

(1) Remove the metal cover of the test set.

(2) Refer to figure 1–3 and perform the operations listed below to expose the front main shaft bearing of the test set for lubrication.

(*a*) Remove the three screws that secure the faceplate (not shown) to the distributor shaft hub and remove the faceplate. (The faceplate is the round metal plate covering the distributor assembly.)

(*b*) Loosen the two lamp arm retaining screws and slide the lamp arm as far as it will go toward the center of the distributor shaft hub.

(*c*) Remove the setscrew that holds the distributor shaft hub to the main shaft, and carefully pull the distributor shaft hub and the attached distributor brush arm and neon lamp arm from the main shaft. Be careful when handling the distributor brush-arm assembly so as not to deform the brushes or the lamp arm.

(*d*) Remove the four screws that hold the retaining plate to the metal distributor housing casting, and pull the retaining plate from the casting. The front main shaft bearing is now exposed for lubrication.

c. Method of Applying Grease and Oil. Apply grease with a small stick, spatula, or with the fingers. Oil should be applied with an oilcan. Small amounts of oil may be applied by dipping the end of a piece of fine gage wire (B & S No. 22), into the oilcan and touching the wire to the part or parts to be oiled.

d. Lubrication Chart. Use the chart below in conjunction with figure 2–9 when lubricating the test set.

Item No. a	Name of part	Lubricant b	Method and quantity
1	Transmitting contact levers	O	1 drop to bearing and at each shield spring.
2	Code disk shaft bearings	O	1 or 2 drops to bearing at each end.
3	Stop contact lever bearing	O	1 drop to lever bearing.
4	Stop control lever latch bearing	O	1 drop to lever latch bearing.

Item No. a	Name of part	Lubricant b	Method and quantity
5 and 10	Main shaft ball bearings	G	Knead lubricant into space between inner and outer bearing races. Wipe off excess lubricant.
6	Stop contact lever latch cam	G	Apply thin film around outer curved surface.
7	Reverse rotation stop pulley	G	Grease groove sparingly.
8	Reverse rotation stop wedge bearing	O	1 drop to stop wedge bearing.
9	Code disk cams	G	Apply thin film around outer curved surfaces.
11	Motor bearing grease fittings	G	1 or 2 strokes of grease gun plunger to each oiler.
12	Main shaft gears	G	Apply thin film to gear teeth.
13	Motor worm gear	G	Apply thin film to pinion teeth.
14	Intermediate gears	G	Apply thin film to gear teeth.
15	Intermediate shaft	O	3 or 4 drops in end of intermediate shaft.
16	Friction washers	O	Saturate.
17	Code disk shaft gear	G	Apply thin film to gear teeth.
18	Code disk oil wick	O	Saturate.
19	Contact lever bail shaft	O	1 or 2 drops to bearing at each end.
20	Code selecting cylinder	O	1 drop to bearings at each end.
21	Code selecting cylinder camming surfaces.	G	Apply thin film around outer curved surfaces.
22	RUN-STOP control shaft bearing	O	1 or 2 drops to oiler in bearing.
23	Distortion control gear bearings	O	1 to 2 drops to each bearing.
24	Distortion control gears	G	Apply thin film to gear teeth.

[a]Item numbers are lubrication point numbers shown in figure 2–9.
[b]G:Grease, Aircraft; High Temperature, MIL–G–3545A (FSN 9150–273–4003).
O: Lubricating Oil, Aircraft Instrument Low Volatility, MIL–L–6085A (FSN 9150–223–4129).

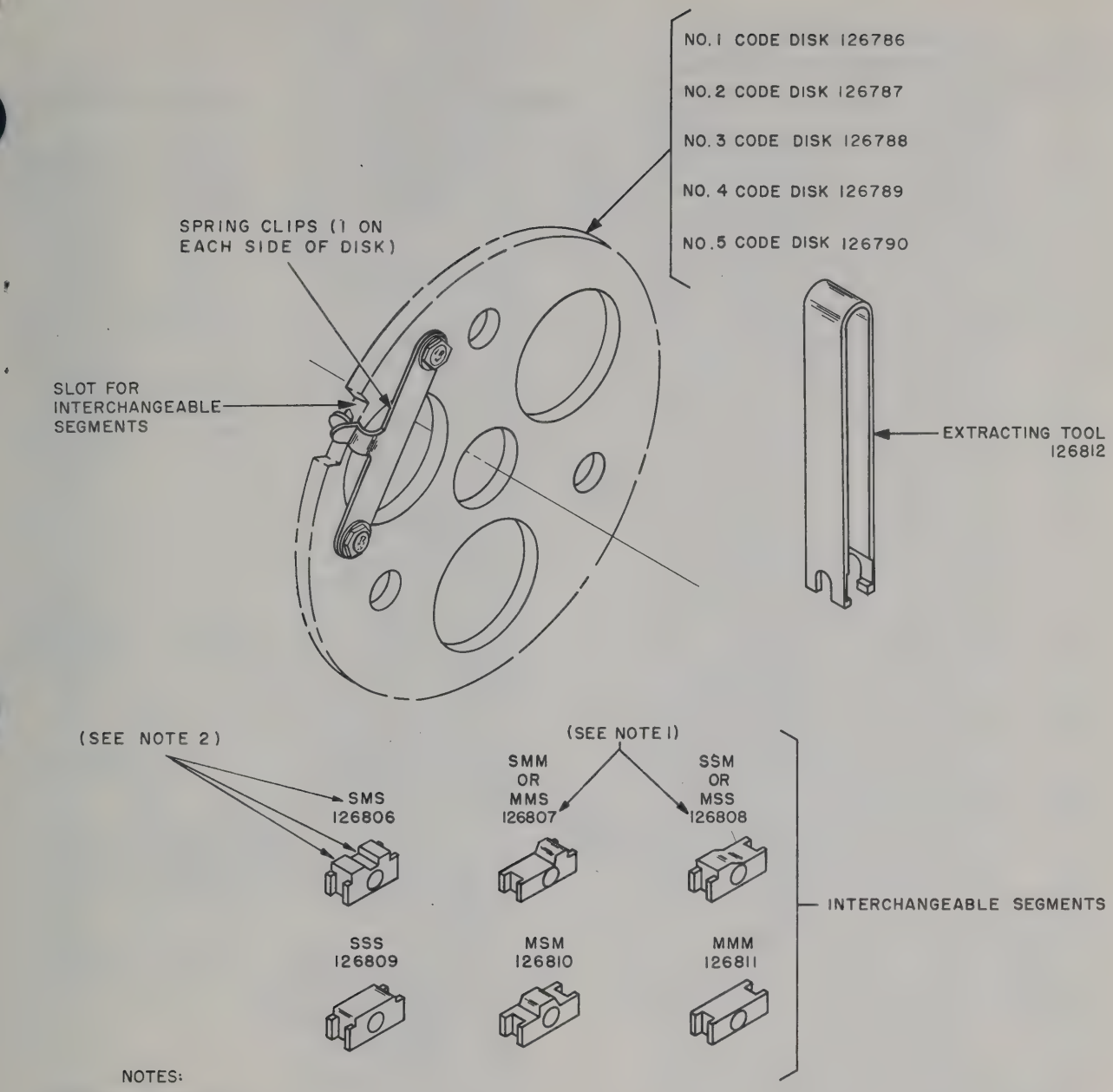

NO. 1 CODE DISK 126786
NO. 2 CODE DISK 126787
NO. 3 CODE DISK 126788
NO. 4 CODE DISK 126789
NO. 5 CODE DISK 126790
SPRING CLIPS (1 ON EACH SIDE OF DISK)
SLOT FOR INTERCHANGEABLE SEGMENTS
EXTRACTING TOOL 126812
(SEE NOTE 2)
(SEE NOTE 1)
SMS 126806
SMM OR MMS 126807
SSM OR MSS 126808
SSS 126809
MSM 126810
MMM 126811
INTERCHANGEABLE SEGMENTS
NOTES:
1. 126807 AND 126808 ARE REVERSIBLE IN POSITION.
2. HIGH SPOTS ON SEGMENTS REPRESENT SPACES (S). LOW SPOTS REPRESENT MARKS (M).
TM6625-364-12-5

Figure 2–6. Code disks, interchangeable code disk segments, and extracting tool.

TELETYPEWRITER CODE

LETTERS	DISK NO.1	DISK NO.2	DISK NO.3	DISK NO.4	DISK NO.5
A	M	M	S	S	S
B	M	S	S	M	M
C	S	M	M	M	S
D	M	S	S	M	S
E	M	S	S	S	S
F	M	S	M	M	S
G	S	M	S	M	M
H	S	S	M	S	M
I	S	M	M	S	S
J	M	M	S	M	S
K	M	M	M	M	S
L	S	M	S	S	M
M	S	S	M	M	M
N	S	S	M	M	S
O	S	S	S	M	M
P	S	M	M	S	M
Q	M	M	M	S	M
R	S	M	S	M	S
S	M	S	M	S	S
T	S	S	S	S	M
U	M	M	M	S	S
V	S	M	M	M	M
W	M	M	S	S	M
X	M	S	M	M	M
Y	M	S	M	S	M
Z	M	S	S	S	M
BLANK	S	S	S	S	S
LETTERS	M	M	M	M	M
FIGURES	M	M	S	M	M
SPACE	S	S	M	S	S
C.R.	S	S	S	M	S
L.F.	S	M	S	S	S

DISKS ARE COUNTED FROM REAR OF TEST SET TO FRONT OF TEST SET. DISK NO. 1 IS FURTHEST FROM FRONT OF TEST SET.

S = SPACE
M = MARK

A

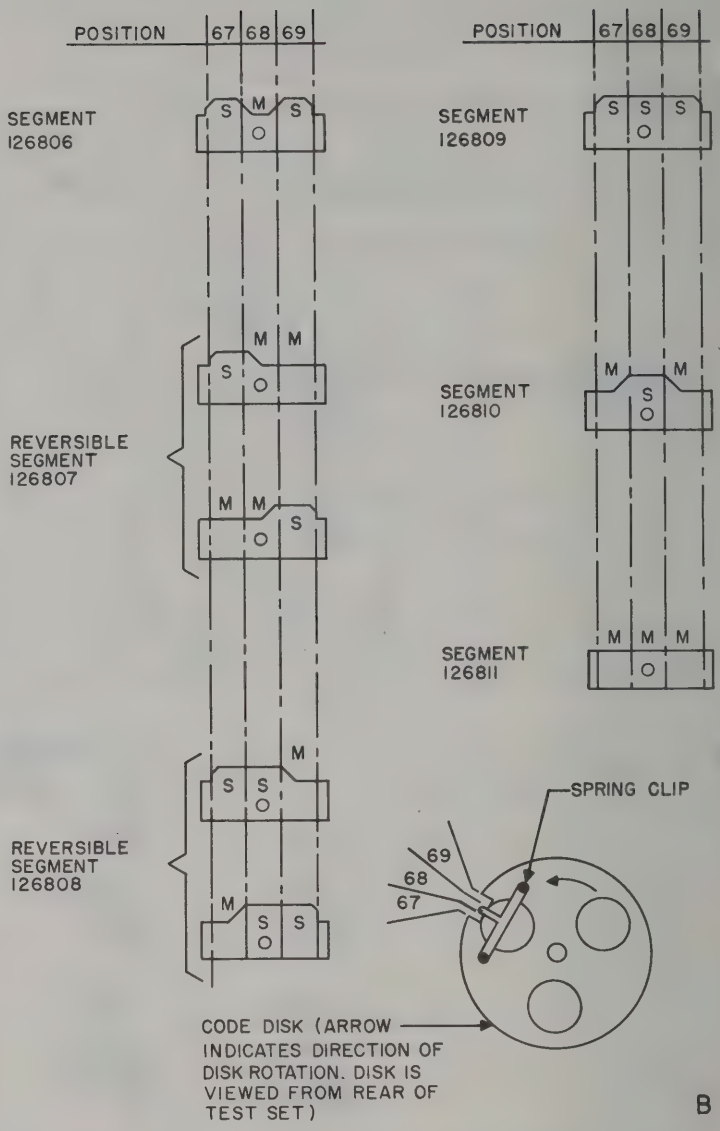


Figure 2-7. Interchangeable code disk segments, installation details.

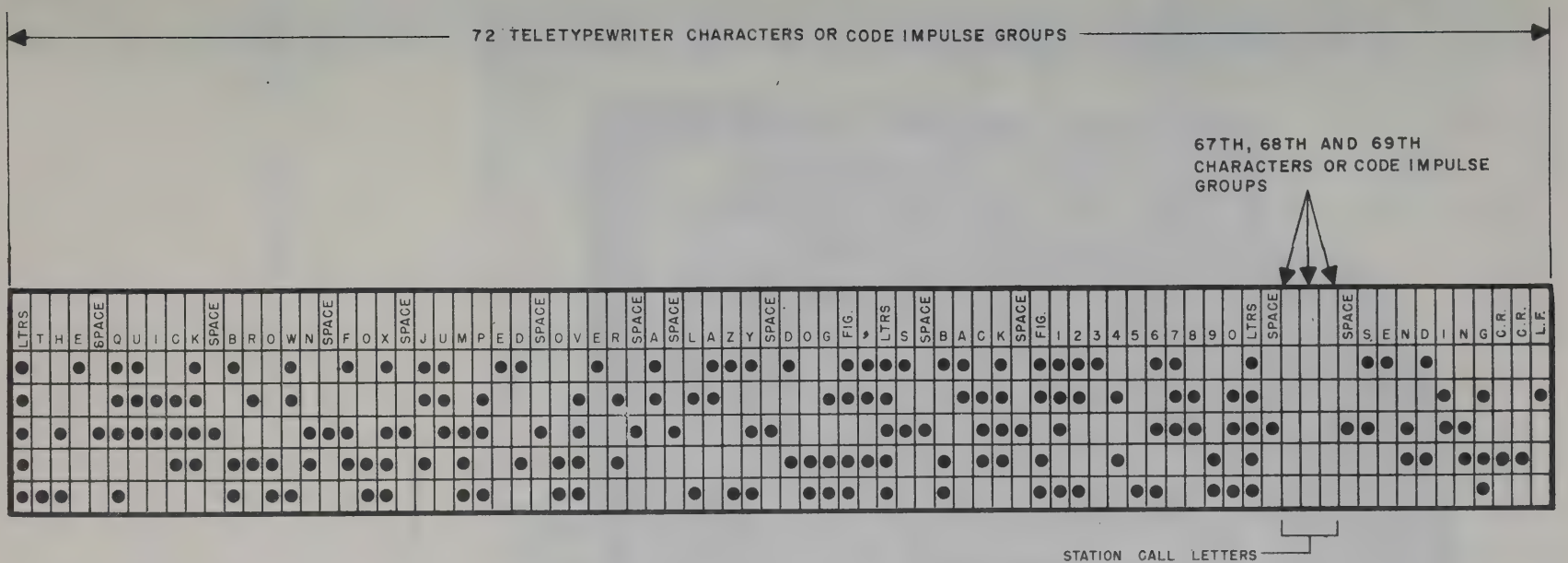

72 TELETYPEWRITER CHARACTERS OR CODE IMPULSE GROUPS
67TH, 68TH AND 69TH CHARACTERS OR CODE IMPULSE GROUPS
LTRS THE SPACE QUICK SPACE BROWN SPACE FOX SPACE JUMPED SPACE OVER SPACE A SPACE LAZY SPACE DOG FIG. ' LTRS S SPACE BACK SPACE FIG. 1 2 3 4 5 6 7 8 9 0 LTRS SPACE SPACE SENDING C.R. C.R. L.F.
STATION CALL LETTERS
TM6625-364-12-18

Figure 2–8. Composition of test message.

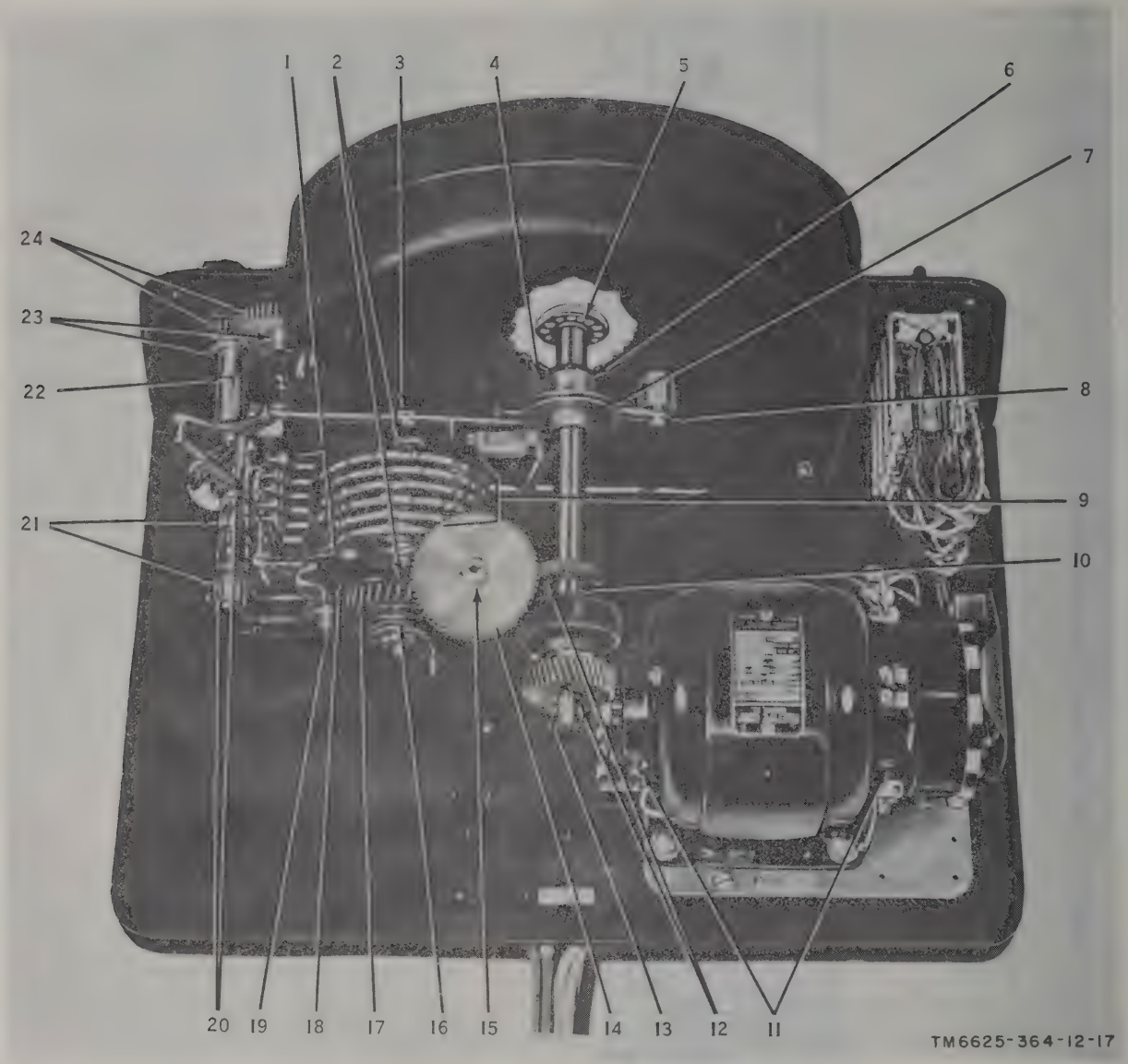


Figure 2-9. Test set lubrication points.

CHAPTER 3
OPERATING INSTRUCTIONS

Section I. CONTROLS, INDICATORS, AND CORDS

3-1. Controls

Controls	Functions
DISTORTION switches:	
BIAS-END DIST. (distortion) switch[a].	Three-position lever switch. Used with the MARK-ZERO-SPACE switch to select the type of distortion generated by the test set.
MARK-ZERO-SPACE switch[a].	Three-position lever switch. Used with the BIAS-END DIST. switch to select the type of distortion generated by the test set.
STROBOSCOPE switches:	
VIEW-TRANSMIT switch[b].	Three-position lever switch. Used with the LINE-DIST. switch to permit viewing of signals generated by the test set or received by the test set from equipment under test. In the VIEW position, the switch connects the pulse producing elements of the test set to the stroboscope so that the signals being generated can be viewed and adjusted before being transmitted to equipment under test. In the TRANSMIT position, the signals generated by the test set are disconnected from the stroboscope and transmitted to equipment under test. *Signals generated by the test set cannot be viewed while being transmitted to equipment under test.* When the VIEW-TRANSMIT switch is in the VIEW position, the RUN-STOP switch should be set at STOP. When the VIEW-TRANSMIT switch is set at TRANSMIT, the RUN-STOP switch should be set at RUN.
LINE-DIST. (distributor) switch[b].	Three-position lever switch. Used with the VIEW-TRANSMIT switch to permit viewing of signals by the test set from equipment under test. When set at LINE, signals received by the test set can be viewed and analyzed. When set at DIST., signals produced by the test set can be viewed and adjusted before transmission to equipment under test.
MOTOR switch	Two-position toggle switch. Controls application of power to the motor of the test set.
INCREASE DISTORTION control	Varies amount of distortion produced by the test set.
RUN-STOP control	Two-position rotary control. Controls the transmission of signals generated by the test set to equipment under test. In the STOP position, the signal line cord is short circuited and signals generated by the test set *cannot* be transmitted to equipment under test. In the RUN position, the short is removed from the signal cord and signals generated by the test set are transmitted to equipment under test.

Controls	Functions
Test signal control	Nine-position rotary control. Selects type of test signal generated by the test set.
	Position — Test signals generated
	TEST MESSAGE — THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING followed by two carriage return functions and one line-feed function (fig. 2–8).
	Y — Y
	BLK — Code length (1.42 units) *stop* impulses (F, fig. 3–6).
	T — T and code length *mark* impulses (G, fig. 3–6). To generate the test signal T, the test signal control must be set at T and the STOP PULSE switch must be set at ON. To generate the code length mark pulses, the test signal control must be set at T and the STOP PULSE switch must be set at OFF.
	O — O
	M — M
	V — V
	LET — Letters shift pulses (H, fig. 3–6).
	R — R (A, fig. 3–6).

[a]The settings of the BIAS-END DIST. and the MARK-ZERO-SPACE switches and the functions derived therefrom are closely interrelated; that is, a particular setting of one must be accompanied by a particular setting of the other to obtain a specific result. See conditions 1 through 4, paragraph 3–4*b*(1).

[b]The functions of the VIEW-TRANSMIT and the LINE-DIST. switches are closely interrelated; that is, a particular setting of one must be accompanied by a particular setting of the other to obtain a specific result. For example, when the VIEW-TRANSMIT switch is in the VIEW position, the LINE-DIST. switch must be in the DIST. position. Similarly, when the VIEW-TRANSMIT switch is in the TRANSMIT position, the LINE-DIST. switch must be in the LINE position. Placing the switches in other than the above positions, with respect to each other, nullifies the action of both switches.

3–2. Indicators

Indicator	Function
Distortion measuring scale.	Used for measuring the length and positioning of teletypewriter impulses produced and received by the test set. Markings on the scale provide for measuring signal distortion in terms of percentage.
Neon lamp indicator	Provides visible means for checking the characteristics of teletypewriter signals produced or received by the test set. The lamp lights each time the test set generates a mark (current) impulse or receives a mark impulse from equipment under test.

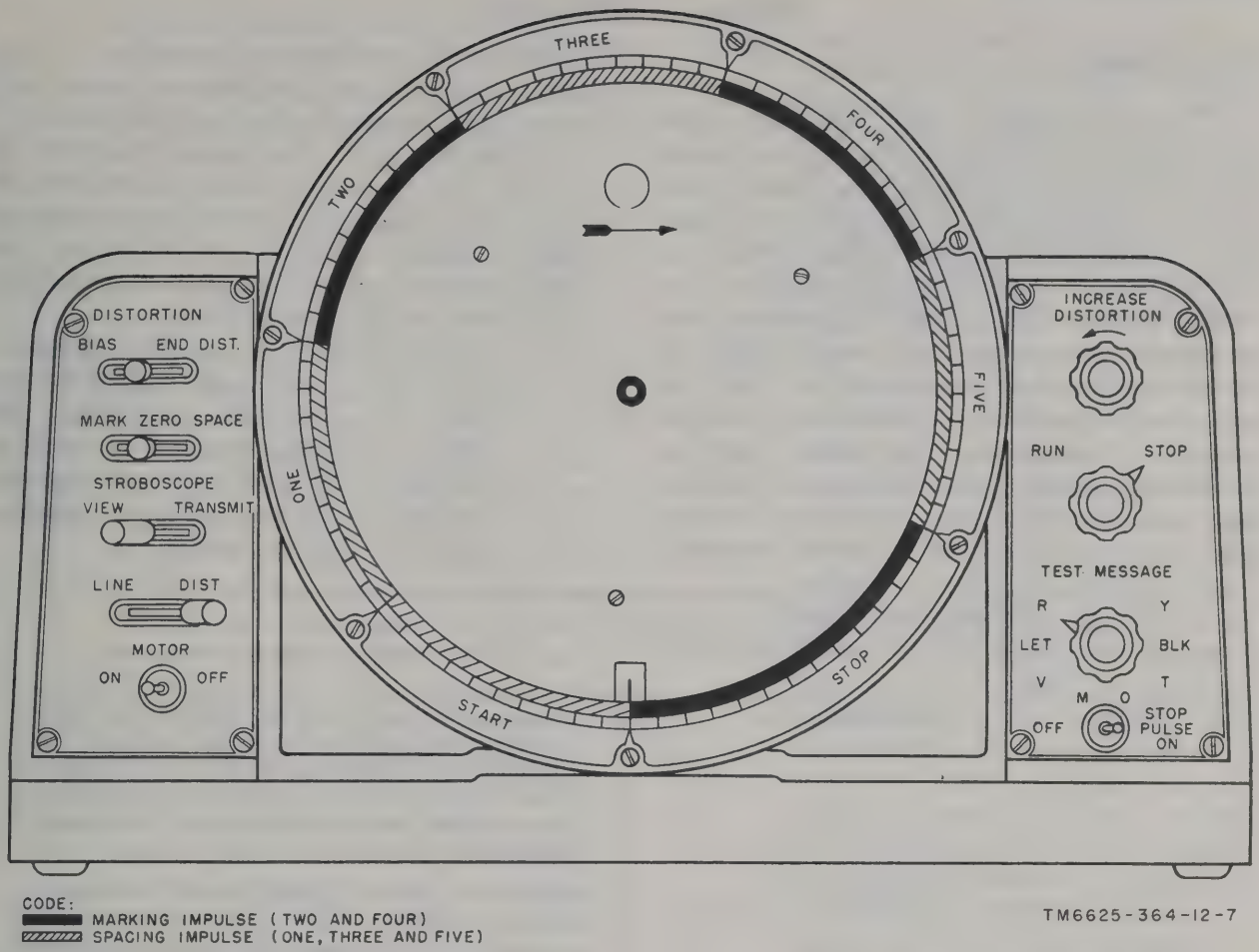


Figure 3–1. Controls and indicators.

3–3. Cords
(fig. 1–2)

The chart below describes the functions of the cords attached to the test set. Typical applications of the cords are shown in figures 3–3, 3–4, and 3–5.

Cord	Function
Motor power cord	Provides for connecting the motor of the test set to a source of ac power.
Stroboscope cord	Provides for connecting the stroboscope of the test set to equipment under test and makes possible viewing of signals received from equipment under test.
Signal line cord	Provides for transmitting signals produced by the test set to equipment under test. (The signal line cord is not associated with the stroboscope of the test set.)
Dc cords (2 ea)	Provide for connecting the stroboscope of the test set to a source of dc power and make possible viewing of signals generated by the test set. The dc cords *are not* used when the test set is receiving signals from equipment under test, but *are* used when adjusting the signals being generated by the test set. Each dc cord contains only one conductor, and both cords must be used together to form a complete circuit. The conductor in each cord terminates in the tip portion of the plug at the end of each cord.

Section II. OPERATION

3-4. General

a. Type Application. The test set transmits signals to equipment under test and checks signals received from equipment under test. Functioning as a receiver, the test set can check the operation of the transmitting portions of teletypewriter, transmitter-distributors, reperforator transmitters, and teletypewriter test equipment. Functioning as a transmitter, the signals generated by the test set are used for adjusting the selector mechanisms of teletypewriters, reperforators, and similar teletypewriter equipment. Functioning as a combination transmitter and receiver, the test set can check the operation of dc and voice frequency teletypewriter terminals and repeaters, polar relays, and other teletypewriter equipment that receives and transmits signals simultaneously.

b. Characteristics of Signals Produced by Test Set. The signals produced by the test set are an exact replica of 7.42-unit teletypewriter signals. Signals containing no distortion, or signals containing up to 100-percent distortion can be generated and transmitted.

(1) The chart below shows the characteristics of the signals generated by the test set. The characteristics of the signals are described in such a manner as to explain how the signals generated affect a start-stop selector unit receiving the signals.

Condition	Position of distortion controls		Characteristics of signals produced
	BIAS-END DIST. switch	MARK-ZERO-SPACE switch	
1	BIAS	MARK	Selector unit receives signals wherein the space-to-mark transitions are advanced uniformly with respect to the beginning of the *start* impulse of the selector unit. Mark impulses are uniformly longer than normal. Signals are illustrated in trace (f), figure 3-2.
2	BIAS	SPACE	Selector unit receives signals wherein the space-to-mark transitions are retarded uniformly with respect to the beginning of the *start* impulse of the selector unit. Space impulses are uniformly longer than normal. Signals are illustrated in trace (e), figure 3-2.
3	END DIST	MARK	Selector unit receives signals wherein the mark-to-space transitions are retarded uniformly with respect to the beginning of the start impulse of the selector unit. Mark impulses are uniformly longer than normal. Signals are illustrated in trace (h), figure 3-2.
4	END DIST	SPACE	Selector unit receives signals wherein the mark-to-space transitions are advanced uniformly with respect to the beginning of the start impulse of the selector unit. Space impulses are uniformly longer than normal. Signals are illustrated in trace (g), figure 3-2.
5	BIAS, neutral (center), or END DIST.	ZERO	Selector unit receives signals wherein the mark-to-space and space-to-mark transitions occur at the proper time. No distortion exists on the signals produced. Signals are illustrated in trace (i), figure 3-2.
6	Neutral (center).	MARK	Same as condition 3 above.
7	Neutral (center).	SPACE	Same as condition 2 above.

(2) Linear illustration of signals containing *spacing and marking bias distortion* and *spacing and marking end distortion*, as produced by the test set and controlled by the settings of the BIAS-END DIST. and the MARK-ZERO-SPACE switches are shown in traces (a), (b), (c), and (d), figure 3–2. Traces (e), (f), (g), and (h) are identical with traces (a) through (d) except that the beginnings of the *start* impulses have been brought into line with each other at point to illustrate the manner in which the signals appear to a receiving start-stop selector unit. This is, point 0 is the position (or time) at which the *start* impulses of the signals generated by the test set and the *start* impulses of the selector unit begin. In addition, all mark-to-space and space-to-mark transitions of the signals produced by the test set are measured from this point. Traces (j) and (k) show the alignment of the movable and the fixed segmented commutator rings in the test set when the test set is producing the signals shown in traces (a) through (d). It is the alignment of these segmented rings (in relation to each other) that determines the length of the pulses produced by the test set and the positions at which the space-to-mark and the mark-to-space transitions occur in the signals produced by the test set.

(*a*) When the test set is producing *spacing bias distortion* and *spacing end distortion* (traces (*a*) and (*c*), respectively), the segments of the movable and the fixed segmented commutator rings are series-connected, and mark pulses are generated during the time shown by dimension A. The effect of this particular segment arrangement is that the test set produces signals that, to a receiving start-stop selector mechanism, look like the signals shown in traces (e) and (g). In trace (e), the selector unit receives signals wherein the space-to-mark transitions are uniformly retarded with respect to the beginning of the *start* impulse. In trace (g), the selector unit receives signals wherein the mark-to-space transitions are uniformly advanced with respect to the beginning of the start impulse.

(*b*) When the test set is producing *marking bias distortion* and *marking end distortion* (traces (b) and (d), respectively), the segments of the movable and the fixed segmented commutator rings are parallel-connected, and mark impulses are produced during the time shown by dimension B. The effect of this particular segment arrangement is that the test set produces signals that, to a receiving start-stop selector mechanism, look like the signals shown in traces (f) and (h). In trace (f), the selector mechanism receives signals wherein space-to-mark transitions are uniformly advanced with respect to the beginning of the *start* impulse. In trace (h), the selector unit receives signals wherein the mark-to-space transitions are uniformly retarded with respect to the beginning of the *start* impulse.

3–5. Testing procedure

The procedure required to test (check) a particular item of teletypewriter equipment will vary depending on the technical characteristics and physical arrangement of the equipment. *For example,* the selector units in some new teletypewriters can tolerate as much as 40-percent distortion and would normally be tested with 40-percent distortion. The same teletypewriters, after several years service probably could not tolerate more than 34-percent distortion. Similarly, one teletypewriter may have binding posts for connecting points, whereas, another teletypewriter may use jacks for the connecting points. Always check the manual

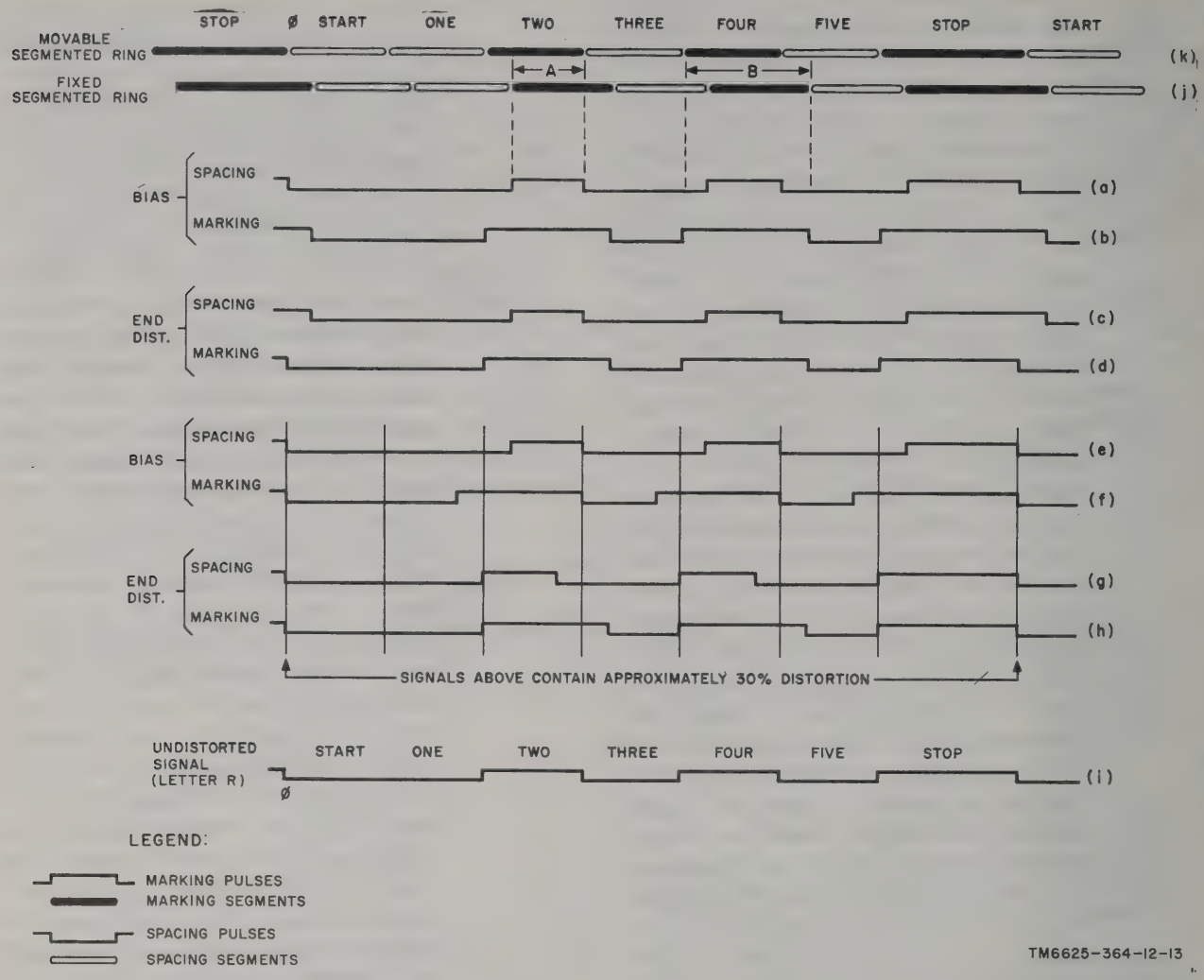


Figure 3–2. Linear presentation of signals produced by test set.

pertaining to the equipment to be tested for information before making any tests.

3–6. Types of Connections

Figures 3–3, 3–4, and 3–5 show the manner in which the test set is connected for use in its three basic applications; that is, as a transmitting device, as a receiving device, and as a combination transmitting and receiving device.

a. Use as Transmitting Device.

(1) Figure 3–3 shows typical connections required for using the test set as a transmitting device. The signal line cord is used to connect the transmitting contacts of the test set to a source of dc power and the selector unit of the equipment under test. (Teletypewriter TT–4A/TG is used in figure 3– as the equipment under test.) The two dc cords are used to connect the test set to a source of dc power for operating the stroboscope while the test set is being set up and adjusted.

(2) When used as a transmitting device, the test set transmits distorted or undistorted signals to the equipment under test. The stroboscope does not operate when the test set is sending signals to the line; therefore, it is impossible to view the signals being transmitted.

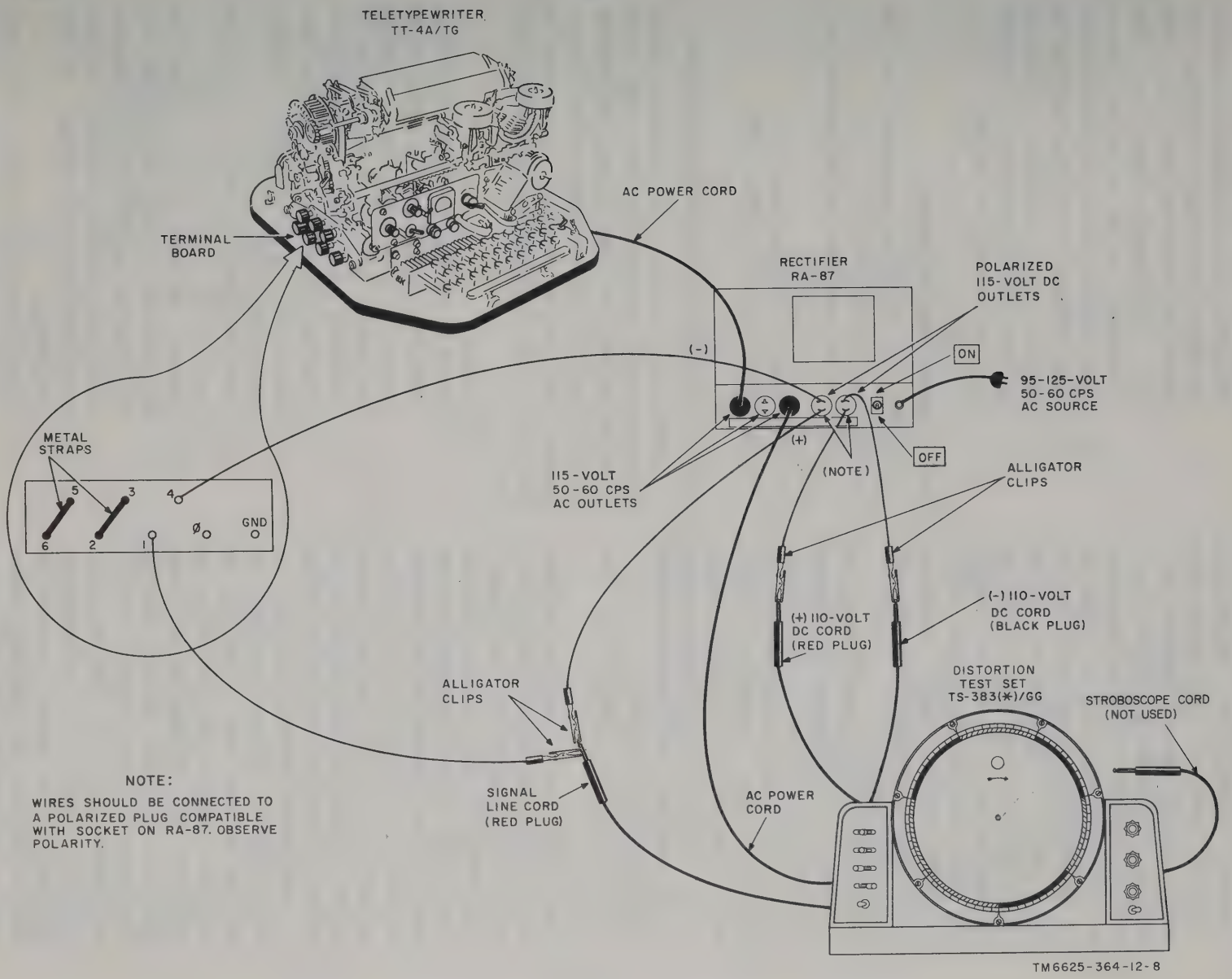


Figure 3–3. Typical connections for using test set as transmitting device.

b. Use as Receiving Device.

(1) Figure 3–4 shows typical connections required for using the test set as a receiving device. The stroboscope cord connects the stroboscope to a source of dc power and to the transmitting contacts of the equipment under test. The two dc cords are used to connect the test set to a source of dc power for operating the stroboscope while the test set is being set up and adjusted. Power to operate the stroboscope while the test set is receiving signals from equipment under test is furnished through the stroboscope cord.

(2) When used as a receiving device, the test set is first adjusted to measure distortion by proper orientation of the distortion measuring scale (para 3–8*b*(2)). The equipment under test is then made to transmit signals to the test set. Any distortion present in the received signals is detected and measured by the test set.

c. Use as Combination Transmitting and Receiving Device.

(1) Figure 3–5 shows typical connections required for use of the test set as a combination transmitting and receiving device. To illustrate the principle used in this type of operation, a polar relay is shown connected as a repeating device; that is, the relay receives signals from the test set and repeats or retransmits the signals back to the test set. Note that in applications as a combination transmitting and receiving device, all cords provided on the test set are used. The two dc cords are used to provide dc for operation of the stroboscope while the test set is being set up and adjusted. The signal line cord carries the signals generated by the test set to the repeating device. The stroboscope cord carries the signals repeated or retransmitted by the repeating device back to the test set. *The signals repeated by the repeating device can be viewed on the stroboscope of the test set.*

(2) In applications as a combination transmitting and receiving device, the test set is first adjusted to measure distortion by properly orienting the distortion measuring scale (para 3–8*b* (2)). Undistorted signals are then transmitted to the repeating device. The repeating device in turn retransmits (repeats) the signals back to the test set. Any distortion introduced by the repeating device is detected and measured by the test set.

3–7. Operational Procedures

Perform the following procedures for any application of the test set:

a. Preliminary and starting procedures (para 3–8).

b. Procedure for checks (para 3–9).

c. Stopping procedures (para 3–10).

3–8. Preliminary and Starting Procedures

Preliminary, starting, and stopping procedures should be accomplished for each application of the test set unless a series of tests are made in sequence. When tests are made in sequence, it will not be necessary to perform the preliminary and starting procedures before each test.

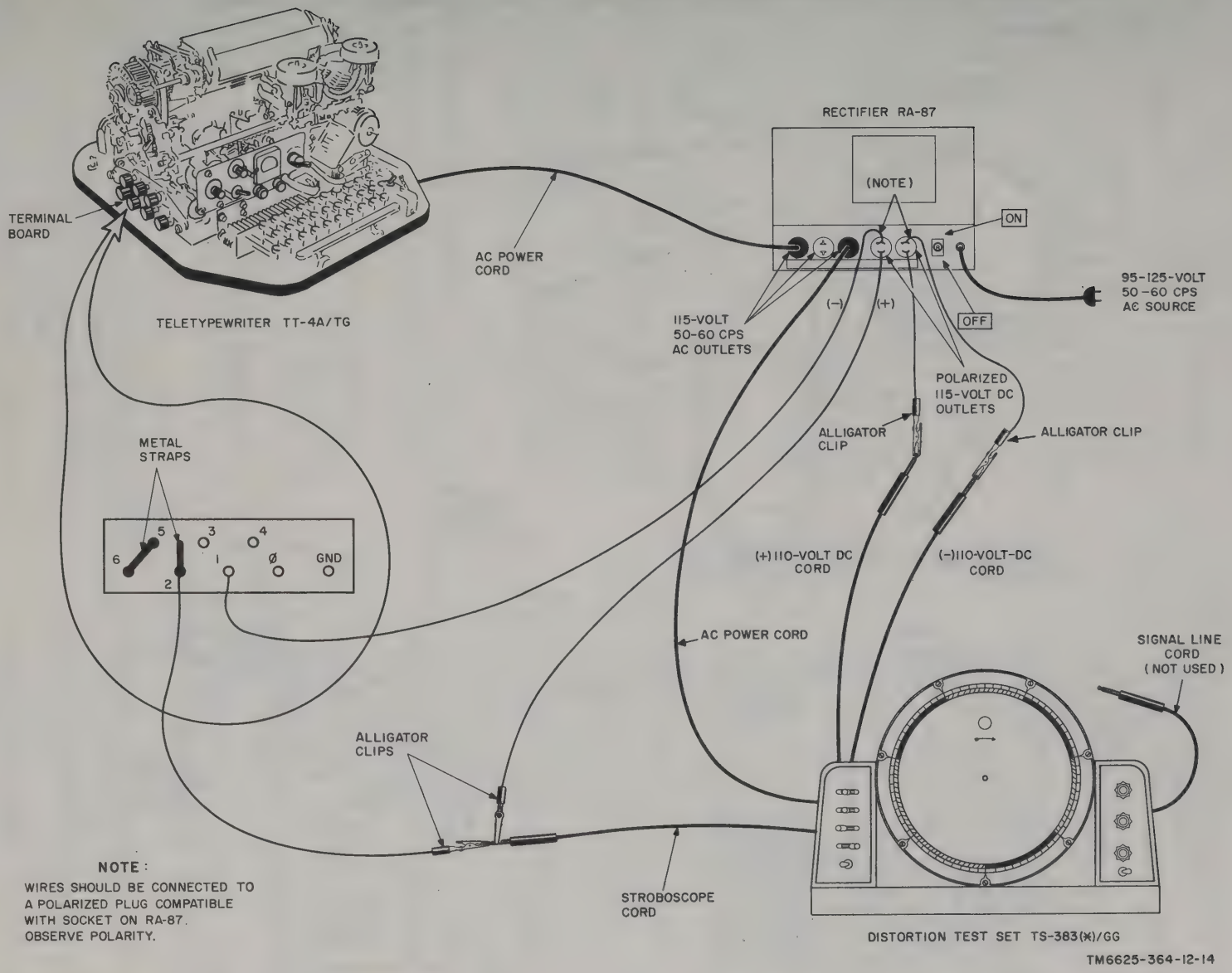
a. Preliminary.

(1) Check to see that the test set and the equipment under test are adjusted to operate at the same speed. Adjust the operating speed of the test set if necessary (para 2–5). If a series-governed motor is installed in the test set, adjust the motor speed if necessary (para 2–6).

(2) Lubricate the test set if necessary (para 2–8).

(3) Connect the test set to a source of 110–115-volt, 50- or 60-cycle-per-second (cps) ac power. If a synchronous motor is installed in the test set, the powerline frequency should be exactly 60 cps.

(4) Place the test set controls in the positions shown below. Always return the controls to the positions shown below after each application of the test set.



NOTE:
WIRES SHOULD BE CONNECTED TO A POLARIZED PLUG COMPATIBLE WITH SOCKET ON RA-87. OBSERVE POLARITY.

Figure 3-4. Typical connections for use of test set as receiving device.

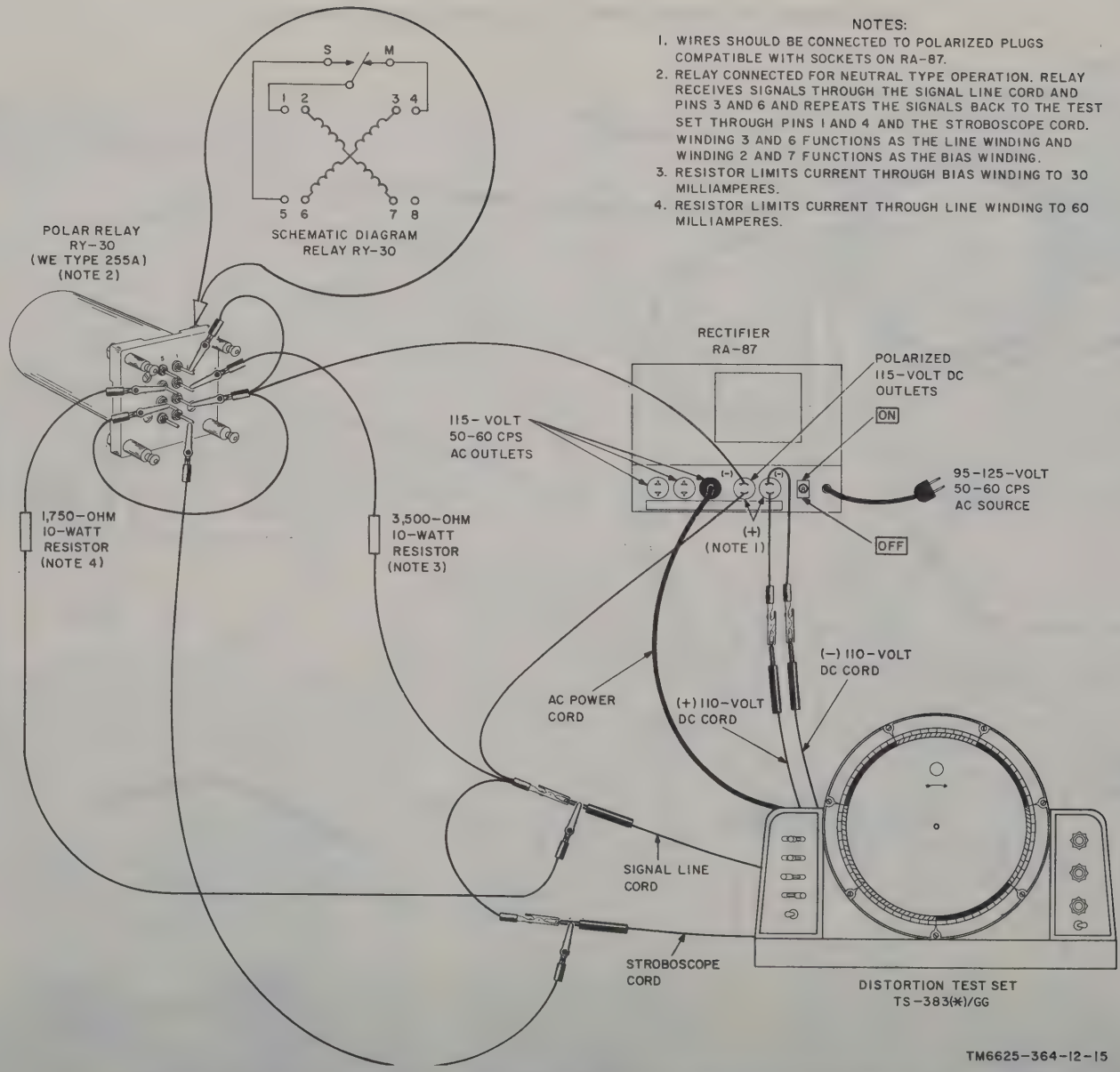


Figure 3-5. Typical connections for use of test set as combination transmitting and receiving device.

Switch	Position
LINE-DIST	DIST.
VIEW-TRANSMIT	VIEW.
MARK-ZERO-SPACE	Neutral (center position).
STOP PULSE	ON.
TEST MESSAGE	R.
RUN-STOP	STOP.

(5) Connect the two dc cords to a source of 115-volt dc power (fig. 3–3).

b. Starting.

(1) Place the test set MOTOR switch at ON. The distributor faceplate will start turning clockwise, and the neon lamp will light each time that a mark pulse is produced. Since the test set is set up to produce the test signal R (*a*(4) above), the lamp will light during mark pulses TWO, FOUR, and STOP.

(2) Rotate the distortion measuring scale until the neon light lights and the numbered segments of the scale are aligned exactly as shown in A, figure 3–6. The scale is now properly oriented for most applications of the test set. Always return the scale to the above position after each application of the test set.

3–9. Procedure for Checks

a. Adjustments for Generating and Transmitting Undistorted Signals.

(1) Perform the procedures described in paragraph 3–8*a*(4) and (5) and *b*.

(2) Change the positions of the test set controls as follows:

(*a*) LINE-DIST. switch to LINE.

(*b*) VIEW-TRANSMIT switch to TRANSMIT.

(*c*) RUN-STOP switch to RUN.

(3) Transmit the signals being generated by connecting the signal line cord to a source of dc power and the equipment under test (fig. 3–3).

b. Adjustments for Generating and Transmitting Distorted Signals.

(1) *Signals containing marking bias distortion.*

(*a*) Perform the procedures described in paragraph 3–8*a*(4) and (5) and *b*.

(*b*) Change the positions of the test set controls as follows:

1. MARK-ZERO-SPACE switch to MARK.

2. BIAS-END DIST. switch to BIAS.

(*c*) Simultaneously rotate the INCREASE DISTORTION control and the distortion measuring scale on the test set until the neon light traces and the scale are aligned exactly as shown in C, figure 3–6. The test set is now generating signals containing 35-percent *marking bias distortion,* and the signals viewed on the stroboscope appear exactly as they are received by a receiving start-stop selector unit. That is, at time or position Ø, the selector unit receives a mark-to-space transition but, further along in time, the space-to-mark transitions occur sooner than they should with respect to time or position Ø This condition is also linearly illustrated in trace (*f*), figure 3–2.

(*d*) Change the positions of the test set controls as follows:

1. LINE-DIST. switch to LINE.

2. VIEW-TRANSMIT switch to TRANSMIT.

3. RUN-STOP switch to RUN.

(*e*) Transmit the signals being generated as indicated in *a*(3) above.

(2) *Signals containing spacing bias distortion.*

(*a*) Perform the procedures described in paragraph 3–8*a*(4) and (5) and *b*.

(*b*) Change the positions of the test set controls as follows:

1. MARK-ZERO-SPACE switch to SPACE.

2. BIAS-END DIST. switch to BIAS.

(*c*) Simultaneously rotate the INCREASE DISTORTION control

and the distortion measuring scale on the test set until the neon light traces and the scale are aligned exactly as shown in B, figure 3–6. The test set is now generating signals containing 50-percent *spacing bias distortion,* and the signals viewed on the stroboscope appear exactly as they are received by a receiving start-stop selector unit. That is, at time or position Ø, the selector unit receives a mark-to-space transition but further along in time, the space-to-mark transisitions occur later than they should with respect to time or position Ø. This condition is also linearly illustrated in trace (f), figure 3–2. The peculiar alignment of the distortion measuring scale in B, figure 3–6, is necessary to overcome a mechanical limitation of the test set. Unless the scale is oriented as shown, it *will not* be possible to view the signals generated by the test set exactly as the signals appear to a receiving start-stop selector unit.

(*d*) Change the positions of the test set controls as follows:

1. LINE-DIST. switch to LINE.
2. VIEW-TRANSMIT switch to TRANSMIT.
3. RUN-STOP switch to RUN.

(*e*) Transmit the signals being generated as indicated in *a*(3) above.

(3) *Signals containing marking end distortion.*

(*a*) Perform the procedures described in paragraph 3–8*a*(4) and (5) and *b*.

(*b*) Change the positions of the test set controls as follows:

1. MARK-ZERO-SPACE switch to MARK.
2. BIAS-END DIST. switch to END DIST.

(*c*) Simultaneously rotate the INCREASE DISTORTION control and the distortion measuring scale on the test set until the neon light traces and the scale are aligned exactly as shown in D, figure 3–6. The test set is now generating signals containing 20-percent *marking end distortion,* and the signals viewed on the stroboscope appear exactly as they are received by a receiving start-stop selector unit. That is, at time or position Ø, the selector unit receives a mark-to-space transition, but further along in time, the mark-to-space transitions occur later than they should with respect to time or position Ø. This condition is also linearly illustrated in trace (h), figure 3–2. The reason for the peculiar alignment of the distortion scale and the neon light traces is the same as explained in (2) (*c*) above.

(*d*) Change the positions of the test set controls as follows:

1. LINE-DIST. switch to LINE.
2. VIEW-TRANSMIT switch to TRANSMIT.
3. RUN-STOP switch to RUN.

(*e*) Transmit the signals being generated as indicated in *a*(3) above.

(4) *Signals containing spacing end distortion.*

(*a*) Perform the procedures described in paragraph 3–8*a*(4) and (5) and *b*.

(*b*) Change the positions of the following controls on the test set:

1. MARK-ZERO-SPACE switch to SPACE.
2. BIAS-END DIST. switch to END DIST.

(*c*) Simultaneously rotate the INCREASE DISTORTION control and the distortion measuring scale on the test set until the neon light traces and the scale are aligned exactly as shown in E, figure 3–6. The test set is now generating signals containing 10-percent *spacing end distortion,* and the signals viewed on the stroboscope appear exactly as they are received by a receiving start-stop selector unit. That

is, at time or position Ø, the selector unit receives a mark-to-space transition, but further along in time, the mark-to-space transitions occur sooner along in time, the mark-to-space transitions occur sooner than they should with respect to time or position Ø. This condition is also linearly illustrated in trace (g), figure 3–2.

(*d*) Change the positions of the test set controls as follows:

1. LINE-DIST. switch to LINE.
2. VIEW-TRANSMIT switch to TRANSMIT.
3. RUN-STOP switch to RUN.

(*e*) Transmit the signals being generated as indicated in *a*(3) above.

c. Adjustments for Checking Received Signals.

(1) Perform the procedures described in paragraph 3–8*a*(4) and (5) and *b*.

(2) Change the positions of the test set controls as follows:

(*a*) LINE-DIST. switch to LINE.

(*b*) VIEW-TRANSMIT switch to TRANSMIT.

(*c*) RUN-STOP switch to RUN.

(3) Connect the stroboscope cord to a source of dc power and the transmitting contacts of the equipment under test (fig. 3–4). The test set is now adjusted to receive signals from equipment under test. Any distortion present on the received signals is detected and measured on the test set.

d. Adjustments for Checking Repeated Signals.

(1) Perform the procedures described in paragraph 3–8*a*(4) and (5) and *b*.

(2) Connect the signal line cord to a source of dc power and the *receive* side of the repeating device being tested.

(3) Connect the stroboscope cord to a source of dc power and the *send* side of the repeating device being tested (fig. 3–5).

(4) Change the positions of the test set controls as follows:

(*a*) LINE-DIST. switch to LINE.

(*b*) VIEW-TRANSMIT switch to TRANSMIT.

(*c*) RUN-STOP switch to RUN.

Note. The test set is now transmitting signals to the repeating device which, in turn, is repeating the signals back to the test set. Any distortion introduced by the repeating device is detected and measured on the test set.

3–10. Stopping Procedures

To stop the test set, place the MOTOR switch at OFF. Disconnect the test set from the equipment under test.

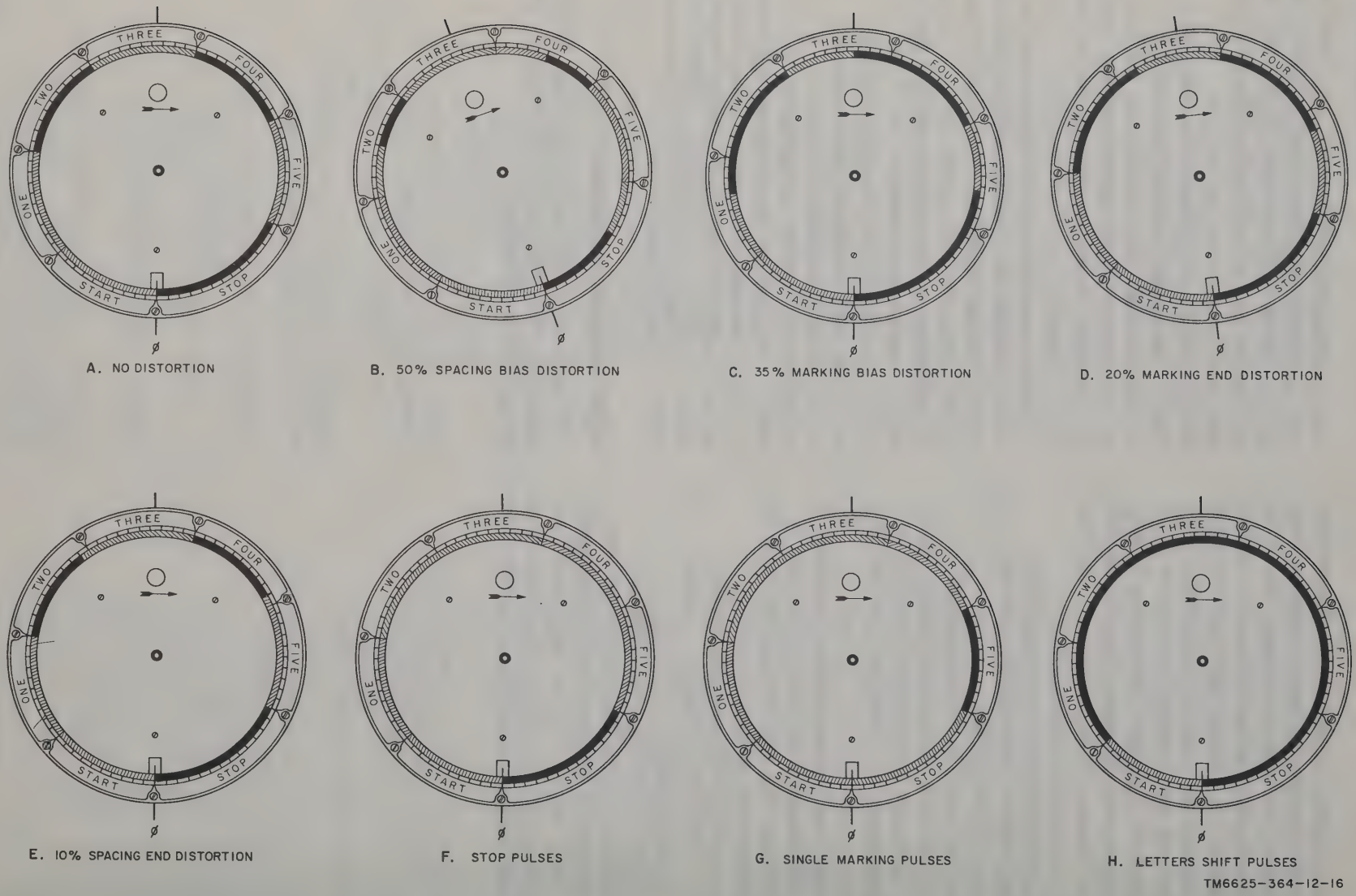


Figure 3-6. Stroboscope displays of signals produced by test set.

CHAPTER 4
MAINTENANCE INSTRUCTIONS

4–1. Scope of Organizational Maintenance

a. The maintenance duties assigned to the organizational repairman of the test set are listed below, together with a reference to the paragraphs covering the specific maintenance functions.

b. Organizational maintenance of the test set includes—

(1) Preventive maintenance (paras 4–3 through 4–7).
(2) Lubrication (para 2–8).
(3) Cleaning (para 4–6).
(4) Preservation (para 4–7).

4–2. Tools and Materials Required

a. Tools. The tools required for preventive maintenance of the test set can be found in Tool Equipment TE–50–B.

b. Materials.

(1) Cleaning Compound (Federal stock No. 7930–395–9542).
(2) Lubricants (para 2–8*d*).
(3) Cleaning cloth.
(4) Cleaning brushes.
(5) Sandpaper.

4–3. Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all categories of maintenance concerned with the equipment, and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks of the test set at the organizational level are made at monthly intervals unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38–750.

4–4. Preventive Maintenance Checks and Services

Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (para 4–5) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance checks and services. Equipment in limited storage requires service before operation but *does not* require monthly preventive maintenance.

4–5. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness	See that the test set is completed	App III.
2	Cords and plugs	Check cords for deterioration and frayed or cut insulation. Inspect for damaged or cracked plug shells. Remove the plug shells and, if necessary, tighten the wire connection.	Figure 1–2.

Sequence No.	Item	Procedure	References
3	Controls	Check the mechanical action of each control (keys, switches, knobs) by operating the controls a few times. Also check the controls for looseness or binding.	Figure 3–1.
4	Hood and cover	Check the metal viewing hood and metal protective cover for dents or improper fit.	Figure 1–2.
5	Distributor and distributor brushes.	Remove the faceplate (the round metal plate inside the distortion measuring scale (fig. 1–1)), and check the commutator rings and the distributor brushes for cleanliness and good contact. If the distributor brushes are frayed or deformed, straighten and adjust them so that they make good contact with the commutator rings. The brush arm and brushes can be raised for cleaning and adjustment by loosening the distributor brush-arm adjusting screw (fig. 1–3) and turning the brush arm counterclockwise. Clean the distributor face and distributor brush arm if necessary (para 4–6).	
6	Distortion scale ring	Rotate the distortion scale ring (fig. 1–3) in both directions and check for stiffness or erratic operation. The ring should move freely in both directions.	
7	Wiring	Check wiring for frayed insulation or other damage. Check for loose connections.	
8	Hardware	Check for loose and missing screws, nuts, and bolts.	
9	Preservation	Check all surfaces for evidence of fungus. Clean all surfaces and remove rust and corrosion; spot paint bare sports.	Paras 4–6 and 4–7.
10	Lubrication	Lubricate the equipment	Para 2–8 and fig. 2–9.
11	Publications	See that all publications are complete serviceable, and current.	DA Pam 310–4.
12	Modifications	Check DA Pam 310–4 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's should be scheduled.	TM 38–750 and DA Pam 310–4.
13	Operation	Operate the equipment per instructions in chapter 3. Report any deficiencies to high level maintenance.	

4–6. Cleaning

Inspect the exterior and interior surfaces of the test set. Also inspect the area inclosed by the bottom cover of the test set. All areas of the test set should be free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt from all accessible areas with a clean, soft cloth or soft cleaning brush. Remove dust and loose dirt from inaccessible areas with compressed air.

Warning: **Clean compound is flammable and its fumes are toxic. Do not use near a flame and provide adequate ventilation.**

b. Remove grease, ground-in dirt, and fungus from all areas with a soft cloth or soft brush dampened with cleaning compound.

c. Remove dirt and grease from the cords and plugs with a soft cloth dampened with cleaning compound.

d. Remove dust, dirt, and grease from the distributor face area (fig. 1–3) with a soft brush dampened with cleaning compound. Wipe off the commutator rings with a soft cloth dampened with cleaning compound. Be careful not to damage the distributor brush arm or brushes during the cleaning process.

4–7. Preservation

Remove rust and corrosion from metal surfaces by lightly sanding the surfaces with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Use paint, enamel, lusterless black, FSN 8010–817–1213. Refer to the applicable cleaning and refinishing practices specified in TB SIG 364.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

5-1. General

The procedure for packing a test set for shipment and storage will depend on the materials available and the conditions under which the test set is to be shipped or stored. However, the procedures outlined in paragraph 5-2 and 5-3 and illustrated in figures 2-1 and 2-2 should be adhered to as closely as possible. Paragraph 5-2 describes the procedure for packing the test set for domestic shipment and storage, and figure 2-1 illustrates the procedure. Paragraph 5-3 describes the procedure for packing the test set for oversea shipment, and figure 2-2 illustrates the procedure.

5-2. Packing for Domestic Shipment and Storage

(fig. 2-1)

a. Materials Required. The chart below shows the type and estimated amounts of materials required for packing a test set for domestic shipment and storage. Stock numbers for the materials required may be found in SB 38-100.

Material	Quantity
Waterproof wrapping paper	15 sq ft
Paperboard cushioning material	25 sq ft
Tape, pressure-sensitive, adhesive, waterproof (2 in. wide).	16 ft
Tape, paper, gummed, sealing and securing.	30 ft
Wooden box (outside dimensions approx 24-7/8 in. long, 23-1/8 in. wide, 18-1/4 in. deep).	1 ea

b. Packing.

(1) Wrap each manual with waterproof wrapping paper and seal the paper with waterproof, pressure-sensitive tape.

(2) Form the cables at the rear of the test set into loops and tape each loop with gummed paper tape.

(3) Wrap the unmounted parts of the test set; motor, gears, code disks and segments, extracting tool, and neon light (app. II), with waterproof wrapping paper and seal each package or bundle with gummed paper tape. Carefully place and distribute these items under the metal cover of the test set.

(4) Wrap the test set with several layers of cardboard cushioning material and seal each layer with gummed paper tape. Overwrap the test set with a layer of waterproof wrapping paper and seal the paper with waterproof, pressure-sensitive tape. The number of layers of cardboard cushioning material required will depend on the size of the wooden box available. Enough cushioning should be used so that the test set fits snugly into the wooden box.

(5) Carefully place the test set into the wooden box; place the manuals in the box as shown, and nail the box closed.

5-3. Packing for Oversea Shipment

(fig. 2-2)

a. Materials Required. The chart below shows the type and estimated amounts of ma-

terials required for packing the test set for oversea shipment. Stock numbers for the materials required may be found in SB 38–100.

Materials	Quantity
Fiberboard box (approx 22 in. long, 21 in. wide, 16 in. deep).	1 ea
Tape, pressure-sensitive, adhesive, waterproof (2 in. wide).	20 ft
Tape, paper, gummed, sealing and securing.	10 ft
Strapping, flat steel (5/8 in. wide x 0.020 in. thick).	15 ft
Waterproof wrapping paper	10 sq ft
Heavy cardboard material (used to build cushioning cells and pads).	15 sq ft
Wooden box (outside dimensions approx 24–7/8 in. long, 23–1/8 in. wide, 18–1/4 in. deep).	1 ea

b. Packing.

(1) Wrap each manual with waterproof wrapping paper and seal the paper with waterproof, pressure-sensitive tape.

(2) Form the cables at the rear of the test set into loops and tape each loop with gummed, paper tape.

(3) Wrap the unmounted parts of the test set; motor, gears, code disks and segments, extracting tool, and neon light (app. II), with waterproof wrapping paper and seal each package or bundle with gummed, paper tape. Carefully place and distribute these items under the metal cover of the test set.

(4) Fabricate the corner pads and other cushioning cells shown in figure 2–2 and position these items in the cardboard container as shown.

(5) Carefully lay the test set into the cardboard container and, after positioning the cell top and manuals as shown, close the container and seal its edges and seams with waterproof, pressure-sensitive tape.

(6) Carefully place the fiberboard container into the wooden box and nail the box closed. Band the box as shown.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

5–4. Authority for Demolition

Demolition of the test set will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 5–5 will be used to prevent further use of the test set.

5–5. Methods of Destruction

Use the following methods to destroy the test set:

a. Smash. Smash the interior of the test set; use sledges, axes, hammers, crowbars, or any other heavy tools available.

b. Cut. Cut cabling; use axes, handaxes, machetes, or similar tools. If time permits, cut all wiring.

***Warning:* Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.**

c. Burn. Burn manuals; use gasoline, kerosene, oil, or incendiary grenades.

d. Dispose. Bury or scatter the destroyed parts in slit trenches, foxholes, or throw them into waterways.

APPENDIX I

REFERENCES

Following is a list of applicable references available to the operator and organizational repairman of the test set.

DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders
SB 38–100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by The Army.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 11–680	Teletypewriter Circuits and Equipment (Fundamentals).
TM 11–5815–270–15	Organizational, DS, GS, and Depot Maintenance Manual: Rectifiers RA–87 and RA–87A.
TM 38–750	Army Equipment Record Procedures.

APPENDIX II

BASIC ISSUE ITEMS

Section I. INTRODUCTION

A2-1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

A2-2. Columns

Columns are as follows:

a. Federal Stock Number. This column lists the 11-digit Federal stock number.

b. Designation by Model. The dagger (†) indicates model in which the part is used.

c. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

d. Unit of Issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

e. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

f. Quantity Authorized. Under "Items comprising an operable equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running spare items" the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

g. Illustration. The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
											FIGURE NO.	ITEM NO.
6625-222-1714							DISTORTION TEST SET TS-383/GG, TS-383A/GG, TS-383B/GG		NX		1-1	
							Model Column 1 applies to TS-383/GG and TS-383A/GG Model Column 2 applies to TS-383B/GG					
							ITEMS COMPRISING AN OPERABLE EQUIPMENT					
ORD THRU AGC	/	/					TECHNICAL MANUAL TM 11-6625-364-12			2		
5815-129-1852	/	/					COVER, SCALE, HOOD: Teletype part No. 121480			1	1-1	121480
5815-412-4782	/	/					GEAR, HELICAL: Teletype part No. 102668 (368 opm w/ PU-93/TG)			1	2-3	102668
5815-412-4780		/					GEAR, HELICAL: Teletype part No. 102663 (368 opm w/ PD-22/UG)			1	2-3	102663
6625-348-2021	/	/					GEAR, HELICAL: Teletype part No. 110899 (600 opm w/ PU-93/TG)			1	2-3	110899
6625-348-2018		/					GEAR, HELICAL: Teletype part No. 110890 (600 opm w/ PD-22/UG			1	2-3	110890
5815-412-4781	/	/					GEAR, WORM: Teletype part No. 102667 (368 opm w/ PU-93/TG			1	2-3	102667
5815-412-4779		/					GEAR, WORM: Teletype part No. 102662 (368 opm w/ PD-22/UG			1	2-3	102662
5815-412-4959		/					GEAR, WORM: Teletype part No. 110889 (600 opm w/ PD-22/UG)			1	2-3	110889
6625-348-2019	/	/					GEAR, WORM: Teletype part No. 110898 (600 opm w/ PU-93/TG)			1	2-3	110898
6105-189-1910	/	/					MOTOR; PU-93/TG: Teletype part No. MU26		NX	1	2-3	
5815-409-0402		/					MOTOR, PD-22/UG: Teletype part No. MU4		NX	1	2-3	
5120-507-3558		/					TOOL, EXTRACTING: Teletype part No. 126812			1	2-3	126812
							RUNNING SPARE ITEMS					
6240-179-1812	/	/					LAMP, GLOW: GE type NE-48			1	1-3	92437

APPENDIX III

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

A3-1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance category.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) is listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the categories.

(*a*) *Service.* To clean, to preserve, and to replenish lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

(*c*) *Inspect.* To verify serviceability and detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(*e*) *Replace.* To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(*f*) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(*g*) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(*h*) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(*i*) *Overhaul.* To restore an item to *completely serviceable* condition as prescribed by serviceability standards. This is accomplished through employment of the technique of "Inspect and Repair only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(*j*) *Rebuild.* To restore an item to a standard as near as possible to ori-

ginal or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications, and subsequent reassembly of the item.

(3) *Operator, organization, direct support, general support, and depot.* The symbol X indicates the category responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Categories higher than those marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintanenace equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding column.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *Operator, organization, direct support, general support, and depot.* The dagger (T) symbol indicates the categories normally allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

A3-2. Maintenance by Using Organizations

When this equipment is used by Signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including general support are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	ECHELON O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
Distortion Test Set TS-383/GG, TS-383A/GG, TS-383B/GG	service		X				4	
	adjust				X	X	2,3	
	test				X	X	1,2,3,	
	repair				X		2,3	
	overhaul					X	2,3	
Motor	replace				X		2,3	
	repair				X		2,3	
	rebuild					X	2,3	

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	ECHELON					TOOL CODE	REMARKS
	O/C	O	DS	GS	D		
Multimeter TS-352/U				†	†		1
Tool Equipment TE-50-B				†	†		2
Tool Equipment TE-111				†	†		3
Tools and test equipment available to the repairman user because of his assigned mission		†					4

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

USASA (2)
CNGB (1)
CC–E (7)
Dir of Trans (1)
CofEngrs (1)
TSG (1)
CofSptS (1)
USAAESWBD (5)
USACDCEA (1)
USACDCCBRA (1)
USACDCCEA (1)
USACDCOA (1)
USACDCQMA (1)
USACDCTA (1)
USACDCADA (1)
USACDCARMA (1)
USACDCARTYA (1)
USACDCSWA (1)
USACDCAVNA (1)
USACDCCEA, Ft Huachuca (1)
USACDCEC (10)
USAMC (5)
USCONARC (5)
ARADCOM (5)
ARADCOM Rgn (2)
OS Maj Comd (4)
LOGCOMD (2)
USAMICOM (4)
USASMC (2)
USASCC (4)
MDW (1)
Armies (2) except
Seventh (5)
EUSA (5)
Corps (2)
USAC (3)
11th Air Aslt Div (3)
507th USASA Gp (2)
508th USASA Gp (2)
318th USASA Bn (2)
319th USASA Bn (2)
320th USASA Bn (2)
177th USASA Co (2)
182d USASA Co (2)
183d USASA Co (2)
184th USASA Co (2)
226th USASA Co (2)
600th USASA Co (2)
USATC (2)
USMA (5)
Svc Colleges (2)
Br Svc Sch (2) except
USASESCS (60)
USASCS (100)
WRAMC (1)
Army Pic Cen (2)
Instl (2) except
Ft Carson (25)
Ft Monmouth (70)
Ft Gordon (10)
Ft Hancock (4)
Ft Huachuca (10)
Ft Knox (12)
WSMR (5)
Army Dep (2) except
SHAD (3)
SAAD (30)
TOAD (14)
FTWOAD (10)
LEAD (7)
NAAD (5)
AVAD (5)
ANAD (5)
CHAD (3)
ATAD (10)
LBAD (14)
Gen Dep (2)
Sig Sec, Gen Dep (5)
Sig Dep (12)
Sig Fld Maint Shops (2)
AMS (1)
USAERDAA (2)
USAERDAW (13)
Rock Island Arsenal (5)
4th USASA Fld Sta (2)
9th USASA Fld Sta (2)
13th USASA Fld Sta (2)
14th USASA Fld Sta (2)
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11–157
11–500 (AA–AE)
11–555
11–587
11–592
11–597
17
17–100
29–1
29–11
29–15
29–16
29–21
29–25
29–26
29–35
29–36
29–75
29–79
29–105
29–109
32–52
32–57
32–67
32–68
32–500
37
37–100
44–7
57–100

NG: State (3), units—Same as active Army except allowance is one copy to each Unit.
USAR: None.
For explanation of abbreviations used, see AR 320–50.

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